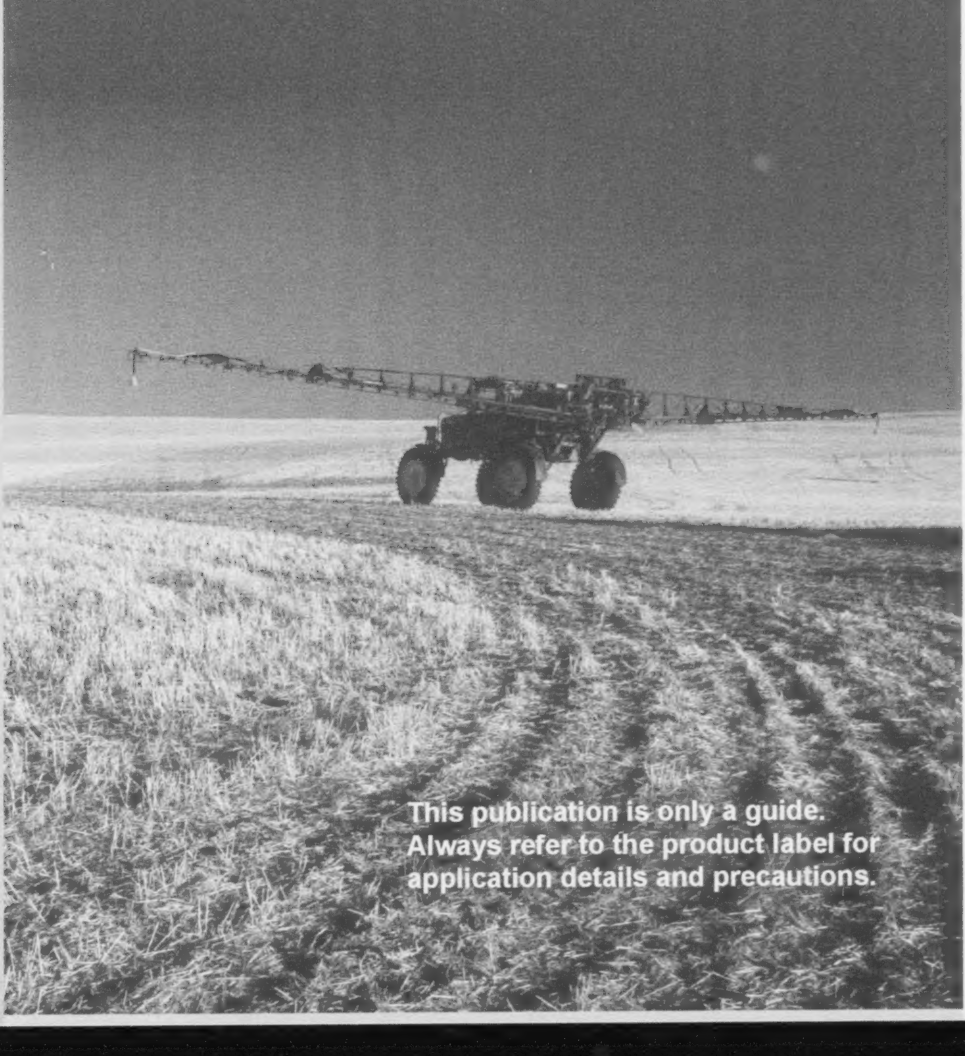
2013 GUIDE TO CROP PROTECTION

weeds, plant diseases, insects

CROPS



This publication is only a guide. Always refer to the product label for application details and precautions.

Introduction
Weed Control
Foliar Fungicides
Seed Treatments
Insect Control

Saskatchewan
Ministry of
Agriculture

Saskatchewan Ministry of Agriculture

Spring Update: An update to this publication is produced for May 1 each year that provides corrections and new uses that have been registered since printing. The Spring Update to the Guide to Crop Protection is available through the Saskatchewan Agriculture Regional Offices, the Agriculture Knowledge Centre or on the Saskatchewan Agriculture website at www.agriculture.gov.sk.ca. Your local dealer may also have copies available.

Saskatchewan Agriculture Regional Offices

Saskatchewan Agriculture Regional Offices provide publications and personal service on a range of topics. Specialists in Crops, Forage, Livestock and Farm Business Management are available to assist you at the following Regional Offices.

Kindersley (306) 463-5513	Prince Albert (306) 953-2363	Weyburn (306) 848-2857
Moose Jaw 1-866-457-2377	Swift Current (306) 778-8285	Yorkton (306) 786-1531
North Battleford (306) 446-7962	Tisdale (306) 878-8843	
Outlook (306) 867-5575	Watrous (306) 946-3220	

Seven Regional Satellite Offices are also open, and specialists can be booked for appointments at:

Assiniboia 1-866-457-2377	Meadow Lake (306) 446-7962	Wadena (306) 946-3220
Estevan (306) 848-2857	Moosomin (306) 786-1531	
Lloydminster (306) 446-7962	Shaunavon (306) 778-8285	

Agriculture Knowledge Centre 1-866-457-2377

The Agriculture Knowledge Centre provides agricultural information and advice to farmers, ranchers and the agriculture industry on topics such as crop and livestock production; new research and technology; government programs and services; and farm business management. The Agriculture Knowledge Centre has resource agents and specialists who are knowledgeable and committed to providing expert technical information and excellence in client service.

Crop Protection Laboratory (306) 787-8130

The Crop Protection Laboratory offers a range of diagnostic services to assist in the identification of problems associated with all agricultural crops and forage. The major areas of expertise include weed, insect and plant disease identification and herbicide resistance screening.

A Crop Protection Laboratory submission form should be completed fully and included with each sample to provide important background information for a more accurate diagnosis. Crop Protection Laboratory submission forms and instructions on sample submission can be found at www.agriculture.gov.sk.ca and select "Crops" from the menu then select "Crop Protection Laboratory Services" from the list of links. You can also contact the Crop Protection Lab directly at (306) 787-8130 or email croplab@gov.sk.ca for a full list of services and fees.

Pest Management Regulatory Agency (PMRA)

www.hc-sc.gc.ca/cps-spc/pest/index-eng.php

Information service (Ottawa)	1-800-267-6315
Regional Compliance (Saskatchewan)	(306) 780-7123

Agriculture and Agri-Food Canada (AAFC)

Saskatoon Research Centre	(306) 956-7200
Scott Research Farm	(306) 247-2011
Melfort Research Farm	(306) 752-2776

Shelterbelts

AAFC - Agroforestry Development Centre

Indian Head - toll free	1-866-766-2284

Pesticide Residue Analysis

(herbicide, fungicide or insecticide)

ALS Labs	1-800-668-8370

www.alsenviro.com

Additional Information

For more information on herbicides, pesticides, pesticide safety and weed, insect or plant disease control, consult the publications available from the Agriculture Knowledge Centre or visit the Saskatchewan Agriculture website at www.agriculture.gov.sk.ca.

Major Poison Control Centres

Saskatchewan Health
1-866-454-1212

Saskatoon	Regina
Royal University Hospital	Regina General Hospital
(306) 655-1010	(306) 766-4545
1-800-363-7474	1-800-667-4545

Toxicology Centre

University of Saskatchewan
(306) 966-7441 or (306) 966-7442
tox.centre@usask.ca; www.usask.ca/toxicology

Spill Report

Saskatchewan Environment -
www.SaskSpills.ca
1-800-667-7525

This publication was prepared by the Saskatchewan Ministry of Agriculture in co-operation with Manitoba Agriculture, Food and Rural Initiatives, with the assistance of the Saskatchewan Weed Committee.

Cover photos From top left: Stripe rust on flag leaf; Bertha armyworm moth; Juvenile wild buckwheat.
Air Tractor 402 applying fungicide to canola, photo courtesy of Saskatchewan Aerial Applicators Association.

TABLE OF CONTENTS

1. Introduction 10

How to Use This Book 10
Product Labels and PCP Numbers 10
Safe Use of Herbicides, Fungicides and Insecticides 11
Protecting Yourself from Exposure to Herbicides, Fungicides, and Insecticides 11
Protective Clothing 12
Protecting Your Eyes, Face and Lungs 13
Avoiding Spray Drift 13
Herbicide Efficacy With Low-drift Nozzles 14
Handling a Drift Complaint 14
Mixing Pesticides 14
Container Disposal 15
Sprayer Tank Cleaning 15
How to Identify Crop and Weed Leaf Stages 17
Pesticide Formulations and Companies 20
Key to product pages 27

2. Weed Control 30

Integrated Weed Management 30
Making Spray Decisions 30
Weed Resistance to Herbicides 38
Surfactants and Herbicide Registrations 42
Oil-based Adjuvants and Herbicide Registrations 42
Adjuvants and Your Herbicide 43
Crop and Herbicide Recommendation Tables 43
Special Weed Problems 55
Soil Residual Herbicides 60
Effect of Rainfall on Herbicide Efficacy 63
Products Available as Prepackaged Tank Mixes 64
Herbicide Product Pages 65

3. Plant Disease Control 306
Integrated Plant Disease Management 306
Effects of Weather 309
Resistance Management 309
Fungicide Mode of Action 310
Foliar Fungicide Tables 313
Foliar Fungicide Product Pages 318
Seed Treatment Tables 379
Seed Treatment Product Pages 383

4. Insect Control 438
Insect Control Decisions 438
Field Scouting 438
Insecticides and Bees 439
Insecticide Poisoning in Humans 440
Resistance of Insects to Insecticides 440
Field Scouting and Insect Management Charts (for individual crops) 442
Insect Control in Stored Grain 479
Insecticide Product Pages 483

Reference Material

Pesticide Index 5
Crop Protection Companies .... Inside Cover
Emergency Numbers .... Inside Cover
Agricultural Offices .... Inside Cover
Metric Conversion Factors 9
Tank Mix Cross-Reference Chart. .... Insert, Inside Back Cover
Forage Crops Chart - Recommended Herbicides .... Insert, Inside Back Cover

Pesticide Index

Herbicide Directory

2,4-D 65
2,4-DB 68
AAtrex Liquid 70
Absolute 72
Accent 73
Accurate (see 'metsulfuron') 221
Achieve (Liquid Achieve) (see 'tralkoxydim') 278
Achieve Liquid Gold 75
Adrenalin SC 76
Aim 78
Ally Toss-N-Go (see 'metsulfuron') 221
Altitude FX / FX2 80
Amitrol 240 82
Approve (see 'bromoxynil/2,4-D ester') 112
Ares 83
Arrow (see 'clethodim') 119
Assert 300 SC (see 'imazamethabenz') 196
Assert FL 85
Assure II (see 'quizalofop') 250
Attain XC (see 'fluroxypyr + 2,4-D') 164
Aurora (see 'clodinafop') 122
Authority 86
Authority Charge 88
Avadex Brands 88
Avenge 200 C 92
Avert (see 'imazamethabenz') 196
Axial/Axial BIA 93
Axial iPak 95
Axial Xtreme 96
Badge (see 'bromoxynil/MCPA ester') 113
Banvel II (see 'dicamba') 126
Banvel VM (see 'dicamba') 126
Barricade/Barricade II 98
Basagran Brands 100
Battalion 103
Bengal (see 'fenoxaprop') 154
Bison (see 'tralkoxydim') 278
Blazer 105
Bonanza (see 'trifluralin') 285
Broadband 107
BroadSide (see 'thifensulfuron/tribenuron + MCPA') 274
Bromotril (see 'bromoxynil') 108
Bromoxynil 108
Bromoxynil/2,4-D Ester 112
Bromoxynil/MCPA ester 113
Brotex 240 (see 'bromoxynil') 108
Buctril M (see 'bromoxynil/MCPA ester') 113
Bullwhip (see 'clodinafop') 122
Caliber 625 (see '2,4-DB') 68
Casoron 116
Centurion (see 'clethodim') 119
Chateau (see 'flumioxazin') 162
Cheminova Glyphosate (see 'glyphosate') 174
CleanStart 117
ClearOut 41 Plus (see 'glyphosate') 174
Clethodim 119
Clodinafop 122
Clovitox Plus (see 'MCPB/MCPA') 215
Cobutox 625 (see '2,4-DB') 68
Compitox (see 'mecoprop-p') 217
Cordon (see 'fenoxaprop') 154
Cougar (see 'fenoxaprop') 154
Credit 45 (see 'glyphosate') 174
Crush'R Plus (see 'glyphosate') 174
Curtail M 125
Deploy (see 'thifensulfuron/tribenuron') 270
Desica (see 'diquat') 134
Dicamba 126
Dicamba/mecoprop/MCPA 130
Dichlorprop/2,4-D 132
Dichlorprop-D/ Dichlorprop DX (see 'dichlorprop/2,4-D') 132
Diquat 134
Distinct 136
Dual II Magnum 137
DyVel 139
DyVel DSp 141
Eclipse III 143
Edge Granular 144
Embutox 625 (see '2,4-DB) 68
Eptam 8-E 145
Equinox 147
Escort 148
Estaprop Plus / Estaprop XT (see 'dichlorprop/2,4-D') .. 132
Everest (see 'flucarbazone') 159
Everest GBX 150
Express Pro 152
Express SG (see 'tribenuron') 282
Factor 540 (see 'glyphosate') 174
Fenoxaprop 154
FirstStep Complete (see 'tribenuron') 282
FlaxMax DLX 158
Flucarbazone 159
Flumioxazin 162
Flurox 2,4 (see 'fluroxypyr + 2,4-D') 164
Fluroxypyr + 2,4-D 164
Foothills NG (see 'clodinafop') 122
Fortress 167
Frontier Max 169
Frontline 2,4-D XC 170
Frontline XL 172
Gladiator (see 'imazethapyr') 198
Glyfos (see 'glyphosate') 174
Glyphogan (see 'glyphosate') 174
Glyphosate 174
Glyphosate/dicamba 186
Gramoxone 188
Grazon 189
Harmony K 190
Harmony Max 191
Harmony SG 192
Hawkeye Power (see 'dicamba') 126
Heat 193
Horizon 240EC/Horizon NG (see 'clodinafop') 122
Imazamethabenz 196

Imazethapyr ... 198
Infinity ... 200
Kerb 50-WSP ... 202
Knockout Extra (see 'glyphosate') ... 174
Koril 235 (see 'bromoxynil') ... 108
Ladder (see 'clodinafop') ... 122
Lajj Plus (see 'glyphosate') ... 174
Leader (see 'bromoxynil/2,4-D ester') ... 113
Legend (see 'clodinafop') ... 122
Liberty 150 SN ... 203
Liberty 200 SN ... 206
Linuron ... 207
Logic M ('see bromoxynil/MCPA ester') ... 113
Lontrel 360 ... 210
Lorox (see 'linuron') ... 207
Marengo (see 'tralkoxydim') ... 278
Matrix (see 'glyphosate') ... 174
Maverick III (see 'glyphosate') ... 174
MCPA ... 212
MCPB/MCPA ... 215
Mecoprop-P ... 217
Metribuzin ... 218
Metsulfuron ... 221
Mextrol 450 (see 'bromoxynil/MCPA ester') ... 113
Momentum ... 224
MPower Glyphosate (see 'glyphosate') ... 174
MPower HellCat (see 'fenoxaprop') ... 154
MPower Kamikaze (see imazethapyr') ... 198
MultiStar (see 'imazethapyr') ... 198
Muster Toss-N-Go ... 226
NextStep NG (see 'clodinafop') ... 122
Nimble (see 'thifensulfuron/tribenuron') ... 270
Nuance (see 'tribenuron') ... 282
Nufarm Clodinafop (see 'clodinafop') ... 122
NuGlo (see 'glyphosate') ... 174
OcTTain XL (see 'fluroxypyr + 2,4-D') ... 164
Odyssey ... 228
Odyssey DLX ... 229
Optica Trio ... 230
Option 35 DF/Option 2.25 OD ... 232
Oracle (see 'dicamba') ... 126
Overdrive ... 234
Pardner (see 'bromoxynil') ... 108
Phantom (see imazethapyr') ... 198
Pinnacle SG ... 235
Poast Ultra ... 236
Polaris (see 'glyphosate') ... 174
Pre-Pare ... 239
Pre-Pare + glyphosate ... 241
PrePare Complete (see 'PrePare + glyphosate) ... 241
PrePass XC ... 241
Prestige XC ... 243
Primextra II Magnum ... 245
Princep Nine-T (see 'simazine') ... 259
Prism SG ... 246
Pulsar ... 248
Puma120 Super / Puma Advance (see 'fenoxaprop') ... 154
Pursuit (see 'imazethapyr') ... 198
Quizalofop ... 250
Reclaim ... 252
Refine M (see 'thifensulfuron/tribenuron + MCPA') ... 274
Refine SG (see 'thifensulfuron/tribenuron') ... 270
Reflex ... 254
Reglone Desiccant (see 'diquat') ... 134
Restore ... 255
Retain ... 256
Reward (see 'diquat') ... 257
Rival (see 'trifluralin') ... 285
Roundup brand products (R/T 540, Transorb HC, Ultra 2, WeatherMax) (see 'glyphosate') ... 174
Rustler (see 'glyphosate/dicamba') ... 175
Salvo (see '2,4-D') ... 65
Select (see 'clethodim') ... 119
Sencor (see 'metribuzin') ... 218
Shadow RTM (see 'clethodim') ... 119
Sharpshooter (see 'glyphosate') ... 174
Sharpshooter Plus (see 'glyphosate') ... 174
Sierra (see 'flucarbazone') ... 159
Signal (see 'clodinafop') ... 122
Signal D ... 258
Signal M ... 259
Simazine ... 259
Simazine 480 (see 'simazine') ... 259
Simplicity ... 261
Slam'R (see 'clodinafop') ... 122
Solo ... 263
Spectrum ... 264
Spike Up (see 'tribenuron') ... 282
Start Up (see 'glyphosate') ... 174
Stellar ... 266
Sword (see 'dicamba/mecoprop/MCPA') ... 130
Takkle (see 'glyphosate/dicamba') ... 186
Tandem ... 267
Target (see 'dicamba/mecoprop/MCPA') ... 130
Tensile ... 269
Thifensulfuron/tribenuron ... 270
Thifensulfuron/tribenuron + MCPA ... 274
Thrasher (see 'bromoxynil /2,4-D ester') ... 112
Thumper (see 'bromoxynil/2,4-D ester') ... 112
Titanium ... 275
Topside (See 'MCPB/MCPA') ... 215
Tordon 22K ... 276
Touchdown Total (see 'glyphosate') ... 174
Tracker XP (see 'dicamba/mecoprop/MCPA') ... 130
Tralkoxydim ... 278
Traxion (see 'glyphosate') ... 174
Traxos ... 280
Treflan (see 'trifluralin') ... 285
Tribenuron ... 282
TriCor (see 'metribuzin') ... 218
Trifluralin ... 285
Triton C ... 290
Triton K ... 292
Trophy 600 ... 294
Tropotox Plus (see 'MCPB/MCPA') ... 215
Tundra ... 295
Turboprop (see 'dichlorprop/2,4-D') ... 132
Ultim ... 297
Valtera (see 'flumioxazin') ... 162
Vantage Plus Max II (see 'glyphosate') ... 174
Varro ... 299
Velocity m3 / All-in-One ... 301
Velpar DF ... 303
Vigil (see 'fenoxaprop') ... 154

Viper/Viper ADV 304
VMD 480 (see 'dicamba') 126
WildCat (see 'fenoxaprop') 154
Wise-Up (see 'glyphosate') 174
Yuma GL (see 'quizalofop') 250

Foliar Fungicide Directory

Acapela 318
Acrobat 50 WP 320
Allegro 500F 321
Astound 322
Azoxystrobin 323
Blanket 325
Bravo 500/Bravo Zn (see 'chlorothalonil') 328
Bumper 418 EC (see 'propiconazole') 352
Cabrio Plus 326
Caramba 327
Chlorothalonil 328
Contans WG 330
Copper 332
Copper 53W/Copper Spray (see 'copper') 332
Curzate 60 DF 334
Cyazofamid 335
Dithane DG Rainshield NT (see 'mancozeb') 326
Echo 720/Echo 90DF (see 'chlorothalonil') 328
Folicur 432 F (see 'tebuconazole') 372
Folicur 250 EW 372
Fuse (see 'tebuconazole') 372
Gavel 75 DF 336
Headline DUO 337
Headline EC 338
Inspire 341
Iprodione 342
Kocide 2000 (see 'copper') 332
Kumulus DF 343
Lance WDG 344
MANA Azoxystrobin (see 'azoxystrobin') 323
Mancozeb 346
Manzate Pro-stick (see 'mancozeb') 346
Overall 240 SC (see 'iprodione') 342
Palliser (see 'tebuconazole') 372
Parasol (see 'copper') 332
Penncozeb 75 DF (see 'mancozeb') 346
Phostrol 347
Pivot 418 EC (see 'propiconazole') 352
Polyram DF 348
Priaxor DS 349
Proline 480 SC 350
Propel (see 'propiconazole') 352
Propiconazole 352
Propiconazole Fungicide (see 'propiconazole') 352
Prosaro 250 EC 355
Quadris (see 'azoxystrobin') 323
Quash 357
Quilt 359
Ranman 400SC (see 'cyazofamid') 335
Reason 500SC 361
Regalia Maxx 362
Revus 363
Revus Top 364
Ridomil Gold (Bravo; SL/Bravo; 480EC; 480SL) 364
Rovral Flo / Rovral RX (see 'iprodione') 342
Scala SC 366
Senator 70WP 367
Serenade Max / Serenade ASO 368
Stratego 250EC 369
Tanos 50 DF 370
Tattoo C 371
Tebuconazole 372
Tilt 250E (see 'propiconazole') 352
Torrent 400 SC (see 'cyazofamid') 335
Twinline 375
Vertisan 376

Seed Treatment Directory

Acceleron DX-910 383
Acceleron Seed Treatment Package 384
Admire SPT (see 'imidacloprid') 407
Agrox B-2/Agrox CD 385
Agrox FL 386
Alias 240 SC (see 'imidacloprid') 407
Allegiance FL (see 'metalaxyl') 414
Apron Advance/Apron Maxx RTA/Maxx RFC 387
Armour (see 'triticonazole') 430
Armour RTU (see 'triticonazole') 430
Belmont 2.7FS (see 'metalaxyl') 414
Charter RTU (see 'triticonazole') 430
Confine 389
Crown 390
Cruiser 5FS 391
Cruiser Maxx Beans / Pulses 392
Cruiser Maxx Vibrance Beans 392
Cruiser Maxx Cereals / Cereals Commercial 394
Cruiser Maxx Vibrance Cereals 394
Cruiser Maxx D Potatoes 397
DB-Red L 398
DCT 399
Dividend XL RTA 400
Gaucho CS FL 402
Gemini 404
General Storage Disinfectant 405
Helix Vibrance. 406
Helix XTra 406
Imidacloprid 407
Kocide 2000 409
Mancozeb 410
Maxim D 411
Maxim Liquid D/PSP/PSP/MZ PSP 411
Maxim Quattro 412

Mertect SC 413
Metalaxyl 414
Polyram 16D 416
Potato ST 16 (see 'mancozeb') 410
Proseed 417
Prosper Evergol / Prosper FX 418
Poncho 600 FS (see 'Prosper Evergol') 418
Rancona Apex 420
Rancona RS. 421
Raxil MD 422
Raxil T 423
Raxil WW 425
Senator PSPT 426
Solan MZ (see 'mancozeb') 410
Sombrero 600 FS (see 'imidacloprid') 407
StorOx 427
Thiram 75WP 428
Titan ST (see 'Prosper FL') 418
Trilex AL 429
Triticonazole 430
Tuberseal (see 'mancozeb') 410
Vibrance 500 FS 431
Vibrance XL / Vibrance XL Co-Pack 433
Vitaflo Brands 435

Insecticide Directory

Actara 483
Admire (see 'imidacloprid') 504
Alias (see 'imidacloprid') 504
Ambush (see 'permethrin') 515
Assail 484
Beleaf 485
Chlorpyrifos 486
Citadel (see 'chlorpyrifos') 486
Clutch 487
Concept 488
Coragen 490
Cygon (see 'dimethoate') 496
Cypermethrin 491
Decis 492
Delegate 493
Diazinon 494
Dibrom 495
Dimethoate 496
Dipel 2X DF 498
Eco Bran 499
Endosulfan 500
Entrust 501
Fulfill 502
Furadan 503
Grapple / Grapple$_2$ (see 'imidacloprid') 504
Imidacloprid 504
Imidan 505
Insecto (see 'Stored Grain") 481
Lagon (see 'dimethoate') 496
Lambda-Cyhalothrin 506
Lannate 508
Lorsban (see 'chlorpyrifos') 486
Malathion 509
Malathion grain dust (see 'Stored Grain') 481
Matador (see 'lambda-cyhalothrin') 506
Monitor 510
Movento 511
Nolo Bait 512
Nufos (see 'chlorpyrifos') 486
Oberon 513
Orthene 514
Permethrin 515
Perm-Up (see 'permethrin') 515
Phostoxin (see 'Stored Grain') 481
Pounce (see 'permethrin') 515
Protect-IT (see 'Stored Grain') 481
Pyrifos (see 'chlorpyrifos') 486
Pyrinex (see 'chlorpyrifos') 486
Rimon 516
Ripcord (see 'cypermethrin') 491
Sevin XLR 517
Silencer (see 'lambda-cyhalothrin') 506
Sluggo 518
Success 519
Tempo (see 'Stored Grain') 481
Thimet 520
Thiodan (see 'endosulfan') 500
Thionex (see 'endosulfan') 500
Up-Cyde (see 'cypermethrin') 491
Vydate 521

Table 1: Metric Conversion Factors* (Approximate)

Metric Unit	*Metric to Imperial Multiply By*	*Imperial Unit*	*Imperial to Metric Multiply By*	*Metric Unit*
LINEAR				**LINEAR**
centimetre (cm)	x 0.39	inch	x 2.54	centimetre (cm)
AREA				**AREA**
square metre (m^2)	x 1.2	square yard	x 0.84	square metre (m^2)
hectare (ha)	x 2.5	acres	x 0.4	hectare (ha)
VOLUME				**VOLUME**
litre (L)	x 0.22	gallon	x 4.55	litre
PRESSURE				**PRESSURE**
kilopascals (kPa)	x 0.14	psi	x 6.9	kilopascals (kPa)
WEIGHT				**WEIGHT**
gram (g)	x 0.035	oz	x 28.35	gram (g)
kilogram (kg)	x 2.2	lb	x 0.454	kilogram (kg)
AGRICULTURAL				**AGRICULTURAL**
litres per hectare (L/ha)	x 0.089	gallons per acre	x 11.23	litres per hectare (L/ha)
litres per hectare (L/ha)	x 0.357	quarts per acre	x 2.81	litres per hectare (L/ha)
litres per hectare (L/ha)	x 0.71	pints per acre	x 1.41	litres per hectare (L/ha)
millilitres per hectare (mL/ha)	x 0.014	fl.oz per acre	x 70.22	millilitres per hectare (mL/ha)
kilograms per hectare (kg/ha)	x 0.89	lb per acre	x 1.12	kilograms per hectare (kg/ha)
grams per hectare (g/ha)	x 0.014	oz per acre	x 70	grams per hectare (g/ha)

*EXAMPLE: To convert centimetres to inches, multiply by 0.39; conversely, to convert inches to centimetres, multiply by 2.54. CAUTION: Herbicide labels are in metric units only. Conversion between the Metric and Imperial system may result in confusion. It is recommended to use metric units only.

Guide to Crop Protection 2013

For Reference Until December 31, 2013
This publication is updated annually and replaces
the 2012 and previous issues.

Introduction

How to Use This Book

This publication is only a guide. Always refer to the product label for application details and precautions.

The *Guide to Crop Protection* is divided into four sections: (1) Weed Control; (2) Foliar Fungicides; (3) Seed Treatments; and (4) Insect Control.

To use the information in each of these sections, use the following process:

1. Turn to the charts at the beginning of each section. There is a set of charts for weeds, plant diseases and insect control. Select the chart for the crop you want or plan to grow. Use the chart to match your weed, disease or insect problems with the products available for that crop.
2. Once you have narrowed your product choices down to a few candidates, go to the recommendation section for that product. Products are listed alphabetically. Read the recommendations thoroughly for each product you are considering.
3. Read the product label attached to the container for detailed instructions on application.

This publication is intended to be used as a guide only. Information contained herein is that available at time of printing. While every effort has been made to ensure accuracy, the provincial government does not accept responsibility for label changes. When more than one trade name is listed, not all weeds or tank mixes may appear on all labels. Consult product labels attached to pesticide containers for final detailed instructions.

Certain recommendations in this publication are given in quantity of commercial product per acre (mL, L, g or kg/acre). Product labels are given in quantity of product per hectare (mL, L, g or kg/ha). To avoid application errors be sure to read and understand label recommendations.

The *Guide to Crop Protection* includes the most recent recommendations for weed, plant disease and insect control in field and forage crops. These recommendations are based on the uses registered under the Pest Management Regulatory Agency's *Pest Control Products Act*. It is an offence under *The Pest Control Products Act* to apply any chemical in a manner not consistent with the product label. If you have any doubts regarding the instructions in this publication, or on the product label, contact the company representative, your local agricultural office or the Pest Management Regulatory Agency for further advice.

Product Labels and PCP Numbers

On each Product Page you will see a Registration or PCP number, so named because it is mandated by the *Pest Control Products Act*. Under the Act, every pesticide requires a unique identifier – the product's Registration or PCP number. That number must also appear on the product's label.

The pesticide label packaged with the product is the authoritative source of information on use of the product and will contain more detailed information than is included in this Guide. Some products have a number of trade names for the same active ingredient. However, each product will have its own Registration (PCP) number and these appear next to the registrants' names. Users who are seeking more detailed information than is provided in this guide, prior to purchase, can use the Registration (PCP) number to access a sample product label online through the Pest Management Regulatory Agency's (PMRA) website or they can contact the PMRA Hotline by phone at 1-800-267-6315.

Use this link – http://www.hc-sc.gc.ca/cps-spc/pest/index-eng.php – and select the link that reads 'Search Pesticide Labels' to access Electronic Label Search Tool. The PMRA Product Information database can be searched by a product's trade name, active ingredient, company name or Registration (PCP) number. Since several products can contain the same active ingredient and there are often several versions of the same or similar labels on this database, using the PCP number is the most direct route to finding the label that links to the product page in this Guide. *There may be some differences between a label found on the package and the sample labels found on the PMRA-Label Search web site so always refer to the packaged product label when applying the product.*

Once the product is located, you may click on its number to view an Adobe Acrobat (PDF) document containing the label and any supplemental registrations. Some of these documents run to many pages but you can use the 'Find' capabilities of the Acrobat Reader plug-in for your browser to jump to specific areas of interest. If you do not have Adobe Acrobat Reader installed on your computer you can download a free version from www.adobe.com

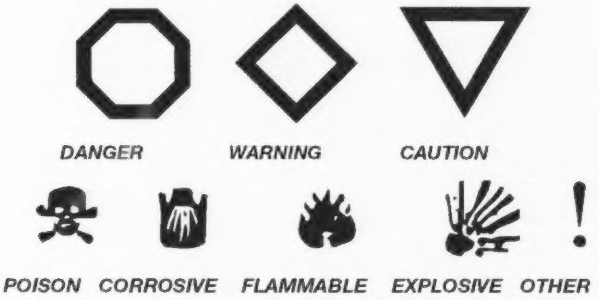
Safe Use of Herbicides, Fungicides and Insecticides

Herbicides, fungicides and insecticides are classified according to the use hazard and risk involved. The categories of hazard are:

- toxicity
- flammability
- explosive potential
- corrosivity
- other

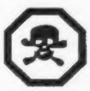
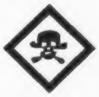
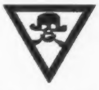
The degree of risk is represented by symbols taken from common traffic sign shapes represented by the stop, caution and yield signs. The signal word for each of the signs is danger (high risk), warning (moderate risk) and caution (low risk). Where the risk is minimal, no designation is required. The label on the container will carry the appropriate signs for the protection of the user. Degree of risk symbols for herbicides, insecticides and fungicides used in field and forage crops are included in the product directory. The symbols are illustrated in Figure 1.

Figure 1. Degree of Risk and Hazard Symbols



LD_{50} values are used to rate the toxicity of pesticides. The LD_{50} refers to the dose of pesticide (in mg per kg of the test animal's body weight) that is lethal to 50 percent of the group of test animals. For example, if a pesticide has an LD_{50} value of 10 mg/kg, and the test animals each weigh 1 kg, then 50 percent of the animals would die if they each ate 10 mg of the pesticide.

Table 2. Oral LD_{50} Values as they relate to the Risk/Hazard Symbols

Symbol	Signal	LD_{50}	Toxicity
	*DANGER POISON*	LD_{50} less than 500 mg/kg	indicates high toxicity
	*WARNING POISON*	LD_{50} 500-1,000 mg/kg	indicates moderate toxicity
	*CAUTION POISON*	LD_{50} 1,000-2,500 mg/kg	indicates low toxicity
	SYMBOL ABSENT	LD_{50} greater than 2,500 mg/kg	indicates very low toxicity

Different types of protective equipment are required for pesticides that differ in toxicity. Special equipment requirements are described on the product label, but in general the following precautions must be taken when using pesticides of different hazard ratings.

Danger Poison - requires goggles, respirator, gloves and skin protection, avoid fumes and spray mist.

Warning Poison - requires goggles, gloves and skin protection, avoid fumes and spray mist.

Caution Poison - requires gloves and skin protection, avoid fumes and spray mist.

The absence of a hazard symbol on a pesticide label indicates low toxicity to mammals. Nevertheless, protective clothing should be worn when using pesticides that do not have a hazard symbol.

Protecting Yourself from Exposure to Herbicides, Fungicides and Insecticides

The use of protective equipment and sound safety procedures will help minimize your exposure to herbicides, fungicides and insecticides. Follow the 10 rules for safe application listed below, and wear the safety equipment recommended.

10 Rules for Safe Application

1. Never smoke or eat while applying pesticides.
2. Avoid inhaling sprays or dusts. Wear protective clothing and a respirator.
3. Sprayer lines carrying chemicals should not enter the operator's cab.
4. Have soap, water and a towel available. Should concentrated product spill on skin, hands, face or eyes, wash immediately.
5. Wash hands and face when leaving the treated area, before break periods, lunch or urination.

6. Bathe or shower and change into clean clothing after working with pesticides. Wash clothing each day before re-use.
7. Call a physician or get the patient to a hospital immediately if symptoms of illness occur during or shortly after pesticide application. Be sure to take along the product label or container.
8. Store pesticides out of reach of children and where there is no chance of contact with human food or livestock feeds. Do not store herbicides with insecticides and avoid cross-contamination. Storage areas should be locked.
9. Keep chemicals in their original containers, never in unmarked containers or bottles used for food or drink.
10. Follow proper container disposal methods. All containers should be triple rinsed or pressure rinsed, punctured to render the container non-reusable, and delivered to designated disposal sites.

Protective Clothing

Wear protective equipment as described in the chart to reduce exposure.

EQUIPMENT	PROTECTION	HOW TO WEAR IT
Coveralls	There are two types of coveralls: disposable and reusable. Disposable coveralls are lightweight and comfortable on warm days. They can be worn for mixing and applying pesticides, then discarded at the day's end. If they become contaminated, they should be discarded at once. The second type of coverall is made of washable fabric and may be reused many times. These fabric coveralls are adequate for use with all but the most highly toxic and concentrated pesticides.	Button (or zip) right up to the neck. Loose coveralls around the neck will suck and blow pesticide in and out of the interior of the coveralls as you bend and move. Wear coveralls over a long-sleeved shirt and pants.
Aprons	When pouring or otherwise handling concentrated pesticides, it makes good sense to wear protection in the form of an apron. The apron protects the front of your body from spills or splashes of the concentrate. The apron should be made of rubber or synthetic liquid-proof material that will resist the solvents used in formulating the pesticide.	Make sure the apron covers your body from your chest to your boots.
Gloves	Protect your hands by wearing chemical-resistant gloves. Neoprene gloves provide the best protection. Natural rubber gloves may be used when handling organo-phosphorus or carbamate pesticides. Be sure that they are designed for use with solvents and pesticides. Never use lined gloves, gloves with wristbands or leather gloves.	Put gloves on and roll up the first inch or two of the cuff. That way when you lift your hands, any liquid on the gloves won't drip down your arms.
Hats	Use a chemical-resistant hat, preferably made of washable plastic. The hat may be a hard hat or made of flexible plastic. In either case, it should have a plastic sweatband. Wash and dry entire hat after each use and before storing. Ordinary baseball caps with cloth sweatbands are dangerous as they absorb the pesticide and recontaminate the forehead each time you wear them. Even small amounts of moderately or slightly toxic pesticides may cause severe skin irritation or other illness if exposure continues for several days.	
Boots	Wear chemical-resistant, unlined boots. These boots are available in a variety of styles and materials. Neoprene boots are the best. Knee-length boots offer greater protection because they extend above the lower end of the apron. Avoid leather or fabric boots and shoes because these will absorb pesticides and cannot be cleaned effectively.	Wear your pant legs outside the top of your boots. This will prevent spills and splashes from running into the boot and onto your leg.

Protecting Your Eyes, Face and Lungs

Wear the following equipment to protect your facial area from exposure:

EQUIPMENT	PROTECTION	HOW TO WEAR IT
Goggles	Chemical-resistant goggles keep your eyes safe from both splashing and, if using dry formulations, dusts or granules. Don't use goggles with cloth or elastic headbands as these will absorb pesticides.	Wear goggles snugly on your face so that the sides of your head are protected from splashes. If you wear glasses, make sure you purchase goggles that fit snugly over them. Never wear contact lenses when working around pesticides.
Respirators	Only NIOSH-approved respirators should be used. Do not exchange parts of different respirators. (For example, do not use a cartridge produced by Company "A" with a respirator produced by Company "B" as the combination may not provide adequate protection to the user). Dust masks are ineffective in protecting against herbicide vapours. Similarly, the filters on tractor cabs are intended to remove dust and are not designed to protect against herbicide vapours or mists. Chemical cartridge respirators are recommended for outdoor use when mixing and applying herbicides.	When carrying out operations, change filters each day. The cartridge should be replaced when chemical odour becomes apparent or when breathing becomes difficult. New cartridges should always be installed at the beginning of the spray season. Prior to commencing work, check the face seal while the respirator is on the wearer's face. Regardless of design, respirators cannot be worn securely by people wearing beards, moustaches or sideburns.
Face Shields	Goggles offer some protection, but frequently full-face protection is advised or required according to the pesticide label. It is especially important to protect your eyes and face when pouring or mixing liquid concentrates. Effective face shields are made of clear plastic.	Since the shield attaches to the hard hat, you can raise or lower it as needed.

Avoiding Spray Drift

To minimize the risk of drift, follow these guidelines:

1. Do not spray in winds above 15 km/h (9 mph).
2. Do not spray under dead calm conditions in early morning, night, or late evening. These are often associated with temperature inversions and the combination of these factors can result in long-distance spray drift (2 km or more). Fog or dust that seems to hang in the air is a good indicator of an inversion.
3. Avoid nozzle pressures above 45 psi (310 kPa) for conventional flat fan tips.
4. Use a minimum of 45 L/acre water for all pesticides unless otherwise specified for the product.
5. Take note of buffer zones identified in the "Restrictions" section of this guide. Do not spray when the wind is blowing towards a nearby sensitive crop, shelterbelt, garden, or water body.
6. Use amine formulations of 2,4-D or MCPA where possible. Use special care when applying volatile herbicides (most herbicides in Group 3 and Group 4, particularly ester formulations). Avoid spraying these products on or immediately before hot days.
7. Ensure that air flow from air assisted sprayers is properly set to minimize airblast rebound and drift for different crop canopies.
8. Operate nozzles at their minimum recommended height. For 80° tips, this is 18" (45 cm), and for 110° tips, this is 12" (35 cm). Orienting nozzles forward allows further height reductions.
9. Special nozzles are now available that create coarse, low-drift sprays. Pre-orifice, Turbo-TeeJet, or venturi-type nozzles are available from a number of manufacturers, and these reduce drift by 50 to 95 percent. (Refer to the section entitled **Herbicide Efficacy with Low-Drift Nozzles**)
10. Consider equipping your sprayer with protective shrouds. A number of different designs are available that can reduce drift between 35 and 75 percent.

For more information on reducing drift refer the Factsheet entitled "Spray Drift – Causes and Solutions" available at the Saskatchewan Ministry of Agriculture Website: www.agriculture.gov.sk.ca

Herbicide Efficacy with Low-drift Nozzles

A number of low-drift nozzles are now available from different suppliers. Well established nozzles, such as the Turbo TeeJet, reduce drift by about 50 percent and provide equivalent efficacy to a standard flat fan nozzle. Newer nozzles ("venturi" types) are best known for their dramatic ability to reduce drift (50 to 95 percent), but information on pesticide efficacy is still scarce. Initial data suggest that these nozzles perform well at conventional carrier volumes, travel speeds, and product rates. Some aspects require special attention:

Pressure: Most venturi-type nozzles require higher pressures to operate properly. Below 40 psi (275 kPa), patterns may deteriorate rapidly resulting in poor overlaps and erratic control. Higher pressures are recommended (60 to 80 psi, or 415 to 550 kPa). Drift potential remains low, even at these high pressures. When using automatic rate controllers, make sure your pressures remain high enough for good nozzle performance.

Water Volume: Droplet size become more important at lower water volumes. Little is known about low-drift nozzle performance at or below 5 gal/acre (23 L/acre). Since low-drift nozzles generate fewer droplets than conventional nozzles, ensure that water volumes are high enough for coverage when using coarse sprays.

Weed Type: Difficult-to-wet weeds, such as wild oats, green foxtail, lamb's-quarters, and cleavers, typically require finer sprays for effective coverage. When using venturi nozzles on these weeds, make sure your pressure is high enough to achieve good coverage. Larger weeds and reduced product rates typically make chemical control more difficult, and these conditions may also reveal some performance differences between nozzles.

Herbicide Type: According to preliminary results, herbicides that belong to herbicide Groups 2, 4, and 9 perform well with venturi nozzles, even at normal pressures (40 psi). Application of herbicides in Groups 1, 6, 8, and 10 may require higher pressures with venturi nozzles to maintain good performance, especially under challenging conditions. Wild oat control may be reduced with the coarsest sprays, even when applied at high pressure.

Check with your chemical representative to see if the manufacturer supports the use of low-drift nozzles with their products.

More information is available in the factsheet "Pesticide Application and Choosing the Right Nozzles," available from your local extension office or at the Saskatchewan Ministry of Agriculture Website: www.agriculture.gov.sk.ca

Handling a Drift Complaint

When spray drift occurs, it is important to take the right steps to resolve the complaint. If you suspect that your crop or property has been damaged because of spray drift, use the following guidelines for resolving the situation.

1. Are you sure that the symptoms or damage you see has been caused by spray drift? Contact your local agricultural office to help determine if the damage is the result of spray drift.
2. Contact the suspected applicator as soon as possible. View the damage with the suspected applicator and determine if that person did, in fact, cause the damage.
3. If the damage was caused by the applicator, determine the extent of the damage and the level of compensation (if any) with the applicator.
4. If the situation cannot be resolved quickly because of disagreements on the extent of damage or level of compensation, contact your local agricultural office to discuss options on how to proceed. Documentation will be required, particularly if insurance companies are involved.
5. The involvement of a private consultant is recommended if documentation is required. Required documentation often includes samples of the damaged plants, photographs, and yield comparisons to determine losses. Your agricultural office can provide you with a list of private consultants in your area.
6. The best approach is to start an open and honest line of communication with the suspected applicator. The majority of drift complaints are resolved quickly and efficiently by communicating with the applicator, without the involvement of outside parties.

Mixing Pesticides

The ability to control a broad range of weeds or other pests in one pass is the advantage that a mix of two or more products allows. If tank mixing is not done in the correct order, the result could be a tank-load of material that may not control the target pests, cause injury to the crop, plug nozzles, or leave an undesirable residue in the tank that will require extensive cleaning. Mistakes like these are costly, could put the user at unnecessary risk of exposure to the products, or create an environmental disposal problem.

To avoid mixing that may result in incompatibilities, **always consult the label of the products that are being used** to learn the correct order. **Remember to add all like components at the same stage of mixing.** The list below is a general rule-of-thumb for mixing pesticides:

1. Fill the spray tank with 1/4 to 3/4 the amount of water required for the application and turn on the sprayer agitation. Check the products that are being used for the correct amount to add. Once agitation has begun, maintain until the tank is emptied.
2. Add any fertilizer or pH adjuster additives to the tank.
3. Add any wettable powders, water dispersible granules (DF, DG, or WDG), or flowable liquid suspensions to the tank. Add dry products slowly to prevent clogged return lines. Allow sprayer to agitate for a few minutes, allowing the product to become completely suspended in the tank, before adding the next component.

4. Shake any containers of liquid pesticide thoroughly before adding to ensure they are well mixed.
5. Add any pesticides that are solutions (SN) (i.e. amines and salts)
6. Add emulsifiable concentrates (EC, SC) (i.e. esters)
7. Add any surfactants or other adjuvants.

Remember to always consult the label for compatible mixes and recommended mixing order.

Many pesticides will break down if left in the tank for an extended period. Try not to mix any more than you can spray at one time. If you need to stop spraying for a short time, leave the sprayer agitation running to keep products from settling or separating in the tank.

Container Disposal

Proper disposal of used containers and unused pesticides is important to protect the environment and prevent contamination of soil and water resources. Rinse all containers prior to disposal to reduce environmental contamination caused by open dumping of unwanted containers. Only mix as much pesticide solution as is needed to treat the desired area.

Triple Rinsing

Triple rinsing renders used pesticide containers (metal, plastic, glass) more than 99.9 percent free of residues, in most cases.

Here are the steps that should be followed:

1. Empty contents of the container into the spray tank and drain in a vertical position for 30 seconds.
2. Add a measured amount of rinse water or other diluent until container is about one-fifth full.
3. Rinse the container thoroughly and pour the rinsate into the spray tank.
4. Repeat the procedure twice (it should take only about 5 minutes in total).
5. Puncture or break triple rinsed containers to render them non-reusable. Paper bags should be rinsed once prior to disposal.

Pressure Rinsing

Pressure rinsers can be used to rinse any size of empty pesticide container that can be lifted into position over the spray tank. A 30 second rinse with a pressure rinser is convenient and just as effective as triple rinsing. Pressure rinsers are constructed to be thrust into the bottom of a metal can or plastic jug. Holes, situated laterally in the rinser tip, direct water from a pressurized source against the inner sides of the container and effectively wash the residual pesticide into the spray tank. Some farmers have found it convenient to attach a rinser to the pump on their large water storage tank to minimize container handling. Pressure rinsers have the added advantage of rendering containers useless by automatically puncturing them.

Disposal of Containers

Properly rinsed containers should be delivered to a designated pesticide container disposal site. Contact your ag rep, municipal office or weed supervisor for the locations of pesticide container disposal sites in your municipality.

Sprayer Tank Cleaning

When pesticide application is completed each day it is important to empty and clean the sprayer thoroughly to prevent the breakdown of certain pesticides, prevent adhesion of the pesticide to the sprayer, and to maintain the sprayer parts in good condition. Certain pesticides break down very quickly when left in solution, and several pesticide solutions can be corrosive to sprayer parts. Tank cleaning is especially important when changing from one crop to another or from one pesticide to another. Each year several reports are logged of herbicide damage cause by carryover of product residue in the tank. To avoid the risk of contamination, sprayers should be cleaned as soon as possible after application is completed.

Do not clean sprayers where rinsate can run off into ditches or other water bodies, near sensitive plants or shelterbelts, or where other people or animals are likely to walk, to avoid unnecessary exposure to people, animals and the environment.

There are three basic types of rinse solution for cleaning sprayer tanks. Their recipes and basic procedures are outlined below:

The Ammonia Rinse – Fill spray tank and add 1 L of household ammonia (3%) for every 100 L of clean water needed for the rinse and begin agitation. Allow solution to flush through the booms until the boom is completely filled with ammonia solution and top up the tank with water. Circulate the ammonia solution through the tank and pump system for 15 minutes. Flush hoses and booms with ammonia rinse solution again (minimum 5 minutes) before emptying. Remove nozzles and screens and scrub with 0.1 L household ammonia per 10 L clean water and an old toothbrush. Perform clean water rinse to remove ammonia solution prior to next spray load. Some herbicides recommend leaving the ammonia rinse in the tank over night to improve cleaning potential.

The Fresh Water Rinse – The spray tank cleaning should begin and end with a fresh water rinse to remove the majority of potential contaminants prior to the cleansing process or prior to the next round of spraying. Drain the tank of its previous contents and fill the tank with clean water. Open nozzle valves and pump clean water through the booms and hoses. Top up the tank with more clean water and circulate/agitate for at least 10 minutes and empty the tank of waste water. If this is the first rinse after spraying, a high pressure hose could be used to clean residue from all surfaces in the tank. Do not enter the tank during the cleaning process.

The Detergent Rinse – After rinsing with clean water, fill spray tank and add a heavy-duty detergent at 0.25 L per 100 L of water (some suggest a non-ionic surfactant such as Agral 90 or Agsurf at 0.6 L per 100 L of water). Circulate the mixture for a minimum of 5 minutes and spray out through sprayer nozzles. Nozzles and screens are removed and cleaned individually with the same detergent solution in a small container. Soaking in this solution for several hours also helps to loosen any deposits.

The above solutions are just components of the overall sprayer cleaning process. Typical rinse instructions will repeat a combination of one or two or all of these basic rinses. Below we will give some generic rinse instructions utilizing the basic rinses as components of the larger cleaning procedure. Never enter the tank during the cleaning process as some cleansers may release dangerous gases.

Method A –
Drain contents of tank – 1 to 2 X Water Rinse – 2X Ammonia Rinse – 2X Water Rinse (one just prior to the next spraying event)
Products: 2,4-D, Accent, Ally, Atrazine, Avadex, Dicamba, Dichlorprop/2,4-D, DyVel, Escort, Everest, Express Pack, FlaxMax, Fusion, MCPA, Muster, Pinnacle, Poast Ultra, Prism, Rustler, Tordon 22K, Unity.

Method B –
Drain Contents of tank – 2x Water Rinse – 2X Detergent Rinse – 2X Water Rinse
Products: Achieve, Achieve Liquid Gold*, Basagran, Bromoxynil/MCPA, Clethodim, Gramoxone*, Liberty, Puma^{120} Super, Reglone Desiccant*, Reward*, Sencor, trifluralin products, Venture*

*Manufacturers of these products recommend adding a non-ionic surfactant such as Agral 90 or Agsurf at 0.6 L per 100 L of water.

Method C -
Drain Contents of tank – Several repetitions of the Water Rinse with nozzles and screens removed and checked for debris.
Products: Amitrol 240, Assure II, Attain, Dual II Magnum, Eclipse, glyphosate products, Horizon, Horizon BTM, Prestige.

The above directions are general processes based on the similarities of tank cleaning recommendations between products in each of the herbicide groupings. Always follow the specific instructions on the product label.

Several products in the guide do not have label instructions regarding tank cleaning. In the case of products that have no cleaning recommendations on the label, there are some basic principals that can be applied. Products that are water based formulations can usually be cleaned from spray tanks using Method C above. Products that are formulated as an EC, SC or F (flowable) or use a petroleum based adjuvant should at least use Method B. The detergent breaks down the oil that may be sticking to the side of the tank. Products in Group 2 (most will already have a recommendation) will require the use of Method A. The ammonia in Method A either increases the solubility of the product allowing it to be easily removed from the tank surfaces or neutralizes these products. If the product that is to be cleaned out of the tank is a combination of these elements, use a combination of Methods to clean the tank. In these cases, use a good commercial tank-cleaning product from a recognized source, with both ammonia and detergent as components.

Group 2 compounds can occasionally be trapped on the tank walls by petroleum based formulations or adjuvants when tank mixed with other products, resulting in tank residues. A way to reduce the chance of this occurring is to add detergent at 0.25 L per 100 L to the Ammonia Rinse portion to assist with the breakdown of the petroleum coating so that the ammonia may rid the tank of Group 2 product.

It is very important to clean sprayers immediately after every use. With a more diverse rotation, the likelihood of damage from lack of care increases dramatically.

How to Identify Crop and Weed Leaf Stages

Recognition of plant growth stages is essential for effective weed and disease control. Many herbicides and fungicides are safe on a crop only when applied at a specific growth stage. Similarly, weeds are controlled only when they are at certain growth stages.

For most post-emergent products, growth stages are described by the number of leaves. The following is a description of how to count leaves for staging.

Cereals and Annual Grass Weeds

Manufacturers generally use two different systems of staging for grasses. The minimum stages of application are similar, while the later stages may differ.

Some manufacturers use "Total Leaf Count" stages based on the number of leaves on the entire plant, including tillers or secondary shoots. Most recommendations however, are based on the number of main stem leaves and tillers. Tillers or stools are the secondary shoots or stems of a grass plant. Similar to the branches of a broadleaf plant, tillers will emerge from the axils between the leaf and main shoot.

Tillers usually begin to appear at the 3 or 4 leaf stage. When staging a plant in this manner, be sure to identify the tillers first, then count only leaves that originate from the main shoot.

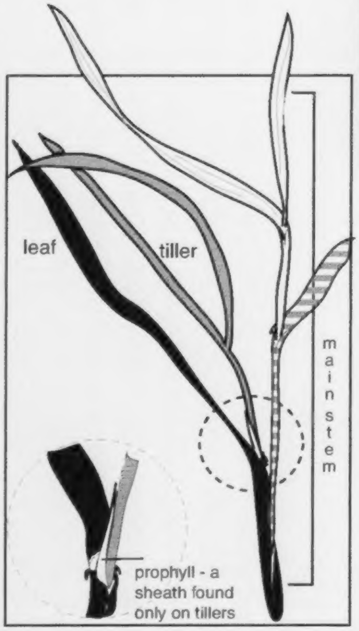

leaf
tiller
main stem
prophyll - a sheath found only on tillers

Figure 2. Leaf Stages of Cereals and Annual Grass Weeds

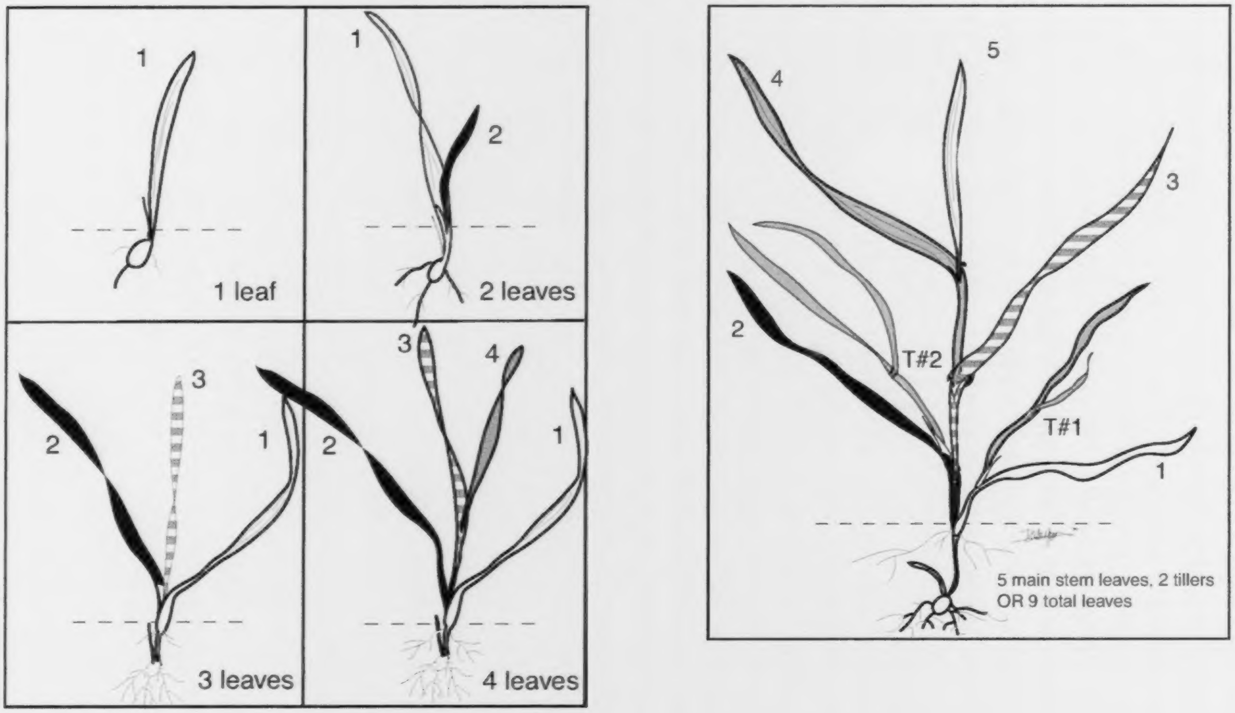
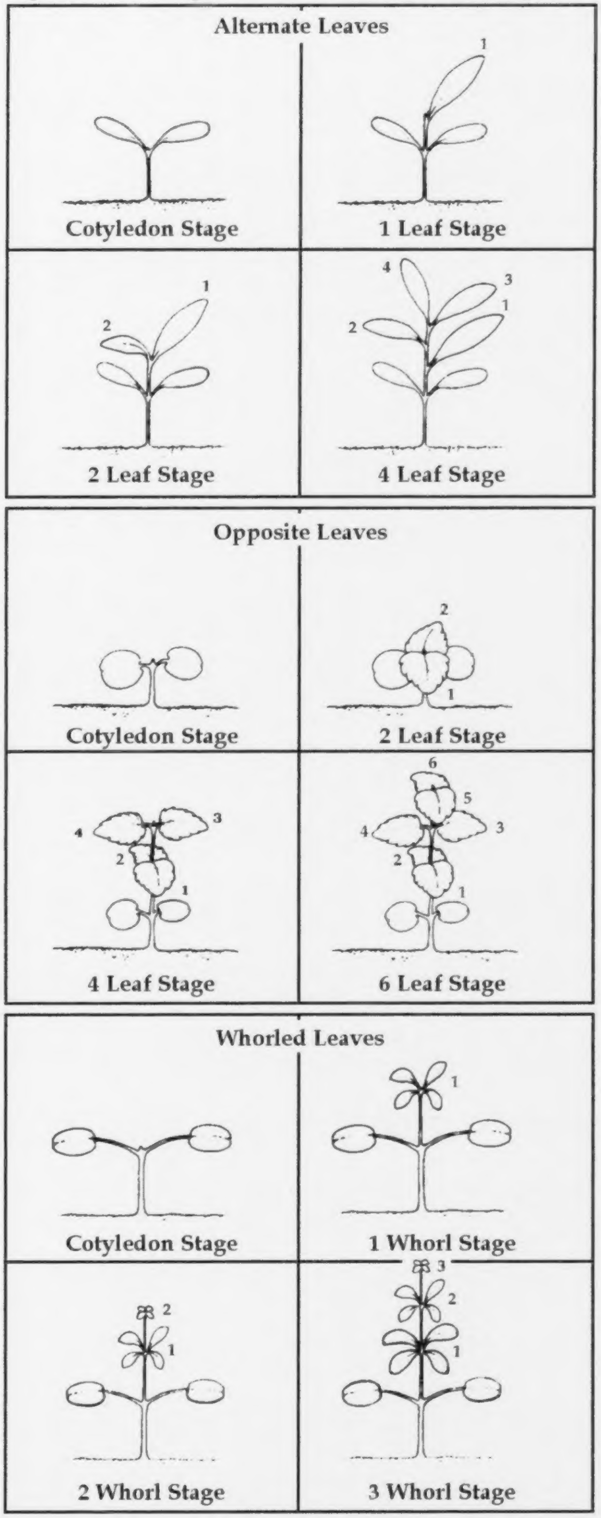

1
1 leaf
1
2
2 leaves
2
3
1
3 leaves
3
4
2
1
4 leaves
4
5
3
2
T#2
T#1
1
5 main stem leaves, 2 tillers OR 9 total leaves

Figure 3. Leaf Stages of Broadleaf Weeds and Crops


Alternate Leaves
Cotyledon Stage
1 Leaf Stage
2 Leaf Stage
4 Leaf Stage
Opposite Leaves
Cotyledon Stage
2 Leaf Stage
4 Leaf Stage
6 Leaf Stage
Whorled Leaves
Cotyledon Stage
1 Whorl Stage
2 Whorl Stage
3 Whorl Stage
1
2
3
4
5
6

Broadleaf Weeds

Cotyledons - These are the seed leaves that usually emerge above ground. On some plants, such as fababeans, lentils and peas, they stay below the soil surface. Cotyledons are not true leaves and are not counted when determining leaf number. They are a different shape than the true leaves and may dry up and disappear at an early stage.

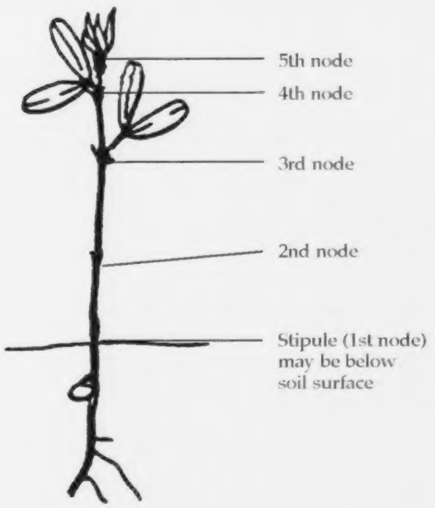
Alternate leaves - Some plants have one leaf at each node on the stem. The next leaf emerges at the next higher node and extends away from the stem in the opposite direction. These plants (lamb's quarters and wild mustard are good examples) are said to have alternate leaves. To determine the leaf stage, simply count the number of leaves present (Figure 3).

Opposite leaves - Plants with two leaves at each node, one on each side of the stem, are said to have opposite leaves. The next pair of leaves on the next node are rotated about 45° so that they are not directly over the previous pair. Plants with opposite leaves have even-leaf numbers only. When counting, the leaf number progresses from cotyledons to 2 leaf, 4 leaf, etc. These plants generally appear shorter than plants with alternate leaves at a similar leaf stage. **Be sure to count each pair as two leaves**. Hemp nettle is a weed that has opposite leaves (Figure 3).

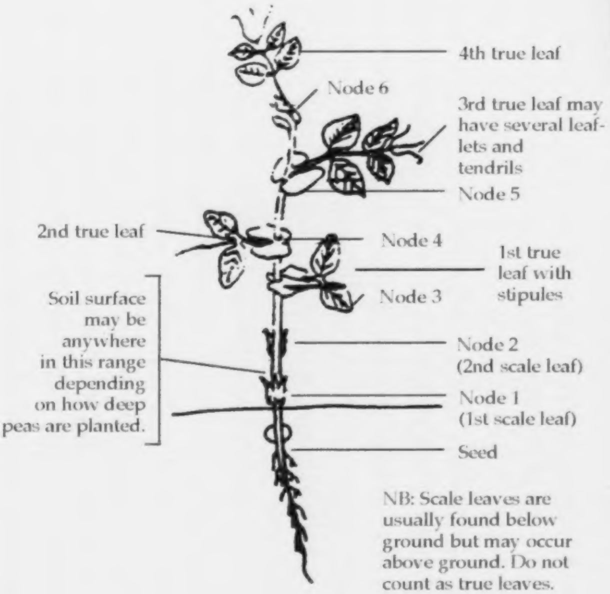
Whorled leaves - More complex plants like cleavers may have whorled leaves. These plants have three or more leaves at each node on the stem. The leaf number in each whorl may vary, so be sure to count each individual leaf unless the Guide or label recommendation refers to the number of leaf whorls (Figure 3).

Figure 4. Leaf Stages of Certain Special Crops and Forages

Lentil Seedling

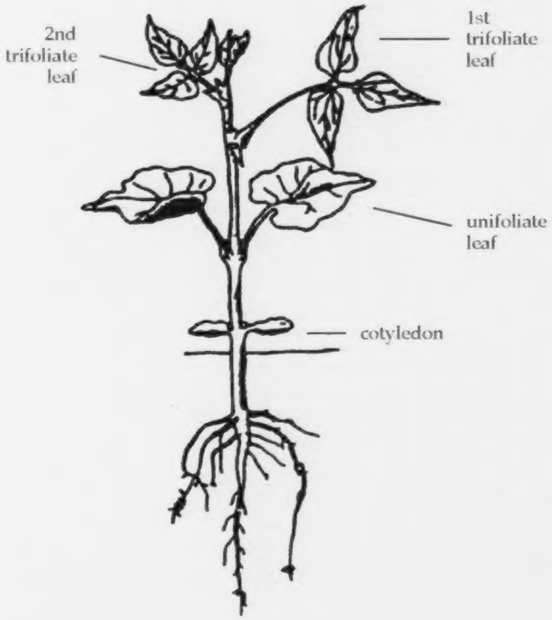

5th node
4th node
3rd node
2nd node
Stipule (1st node) may be below soil surface

Field Pea Seedling

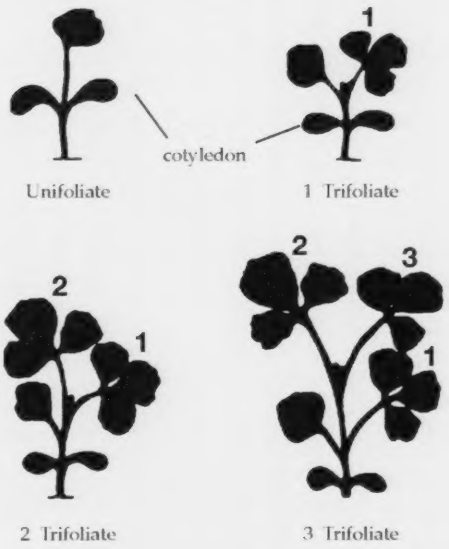

4th true leaf
Node 6
3rd true leaf may have several leaflets and tendrils
Node 5
2nd true leaf
Node 4
1st true leaf with stipules
Node 3
Soil surface may be anywhere in this range depending on how deep peas are planted.
Node 2 (2nd scale leaf)
Node 1 (1st scale leaf)
Seed

NB: Scale leaves are usually found below ground but may occur above ground. Do not count as true leaves.

Dry Bean Seedling


2nd trifoliate leaf
1st trifoliate leaf
unifoliate leaf
cotyledon

Forage Legume Seedling


1
cotyledon
Unifoliate
1 Trifoliate
2
1
2 Trifoliate
2
3
1
3 Trifoliate

Stages of Alfalfa, Red Clover and Alsike Clover Leaf Development

PESTICIDE FORMULATIONS AND COMPANIES

Herbicides

Product	*Common Name*	*Formulation*	*Company*
2,4-D	2,4-D	600, 700 g/L SN, EC	Various
AAtrex Liquid	atrazine	480 g/L SC	Syngenta Canada
Absolute	imazamox : imazethapyr + clopyralid	35% : 35% + 75% DG	BASF Canada
Accent	nicosulfuron	75% DG	E. I. duPont Canada
Accurate	metsulfuron methyl	60% DG	Cheminova Canada
Achieve (Liquid Achieve)	tralkoxydim	400 g/L SC	Dow AgroSciences
Achieve Liquid Gold	tralkoxydim+ bromoxynil : MCPA E	400 g/L SC + 225 : 225 g/L EC	Nufarm Agriculture
Adrenalin SC	imazamox : 2,4-D LV ester	20 : 560 g/L SC	BASF Canada
Aim	carfentrazone	240 g/L EC	FMC Canada
Ally Toss-N-Go	metsulfuron methyl	60% DG	E. I. duPont Canada
Altitude FX	imazamox + fluroxypyr+MCPA 600 ester	120 g/L SN + 180 g/L + 600 g/L EC	BASF Canada
Altitude FX 2	imazamox+fluroxypyr	120 g/L+180 g/L SN	BASF Canada
Amitrol 240	amitrole	231 g/L SN	Nufarm Agriculture
Approve	bromoxynil : : 2,4-D LV E	225 : 225 g/L EC	Nufarm Agriculture
Ares	imazamox : imazapyr	33 : 15% SN	BASF Canada
Arrow	clethodim	240 g/L EC	MANA Canada
Assert 300 SC	imazamethabenz	300 g/L SC	Nufarm Agriculture
Assert FL	imazamethabenz + florasulam+MCPA ester	300 g/L SC + 50 g/L SC+500 g/L EC	Nufarm Agriculture
Assure II	quizalofop-p-ethyl	96 g/L EC	E. I. duPont Canada
Attain XC	fluroxypyr + 2,4-D E	333 g/L + 660 g/L	Dow AgroSciences
Aurora	clodinafop-propargyl	240 g/L EC	Farmers of North America
Authority	sulfentrazone	480 g/L SC	FMC/Nufarm
Authority Charge	sulfentrazone + carfentrazone	480 g/L SC + 240 g/L EC	FMC/Nufarm
Avadex MicroActiv/ Extra Strength BW	triallate	10% G, 480 g/L EC	Gowan Canada
Avenge 200-C	difenzoquat	200 g/L SN	Syngenta for AMVAC
Avert	imazamethabenz	300 g/L SC	Viterra
Axial	pinoxaden	100 g/L EC or 50 g/L EC (BIA)	Syngenta Canada
Axial iPak	pinoxaden + pyrasulfotole : bromoxynil	100 g/L EC or 50 g/L EC (BIA) + 37.5 : 210 g/L EC	Syngenta Canada
Axial Xtreme	pinoxaden : fluroxypyr	50 : 87.5 g/L EC	Syngenta Canada
Badge	bromoxynil : MCPA E	225 : 225 g/L EC	MANA Canada
Banvel II	dicamba (diglycolamine salt)	480 g/L SN	BASF Canada
Banvel VM	dicamba (diglycolamine salt)	480 g/L SN	Engage Agro (BASF)
Barricade	thifensulfuron : tribenuron+fluroxypyr	50% : 50%+180 g/L EC	E I duPont Canada
Barricade II	thifensulfuron : tribenuron+fluroxypyr	50% : 50%+333 g/L EC	E I duPont Canada
Basagran/Basagran Forté	bentazon	480 g/L SN	BASF Canada
Battalion	rimsulfuron + metalachlor + dicamba	25% DF + 915 g/L EC + 480 g/L SN	E. I. duPont Canada
Bengal	fenoxaprop-p-ethyl	120 g/L EC	MANA Canada
Bison	tralkoxydim	400 g/L SC	MANA Canada
Blazer	acifluorfen	240 g/L SN	United Phosphorus Inc.
Bonanza	trifluralin	480 g/L EC, 10% G	UAP
Broadband	pinoxaden : florasulam	92.7 : 7.7 g/L EC	Syngenta Canada
BroadSide	thifensulfuron methyl : tribenuron methyl + MPCA	33 35% : 16 65% WSG + 500 or 600 g/L EC	Viterra
Bromotril	bromoxynil	240 g/L EC	MANA Canada
Brotex	bromoxynil	240 g/L EC	IPCO
Buctril M	bromoxynil : MCPA E	280 : 280 g/L EC	Bayer CropScience
Bullwhip	clodinafop-propargyl	240 g/L EC	Cheminova Canada
Caliber	2,4-DB	625 g/L EC	UAP
Casoron	dichlobenil	4% G	UAP
Centurion	clethodim	240 g/L EC	Bayer CropScience
Chateau	flumioxazin	51% DG	Valent Canada
Cheminova Glyphosate	glyphosate IPA salt	356 g/L SN	Cheminova Canada
ClearOut 41 Plus	glyphosate IPA salt	360 g/L SN	Farmers of North America
Cleanstart	glyphosate IPA + carfentrazone	356 g/L SN + 240 g/L EC	Nufarm Agriculture
Clovitox Plus	MCPB : MCPA	375 : 25 g/L SN	IPCO
Cobutox	2,4-DB	625 g/L EC	IPCO
Compitox	mecoprop-p	150 g/L SN	Nufarm Agriculture
Cordon	fenoxaprop-p-ethyl	120 g/L EC	Nufarm Agriculture
Cougar	fenoxaprop-p-ethyl	120 g/L EC	Cheminova Canada
Credit 45	glyphosate IPA salt	450 g/L SN	Nufarm Agriculture
Crush'R Plus	glyphosate IPA salt	360 g/L SN	AgWest
Curtail M	clopyralid : MCPA E	50 : 280 g/L EC	Nufarm Agriculture
Deploy	thifensulfuron methyl : tribenuron methyl	50% : 25% DG	Arysta LifeScience

Product	*Common Name*	*Formulation*	*Company*
Desica	diquat	240 g/L SN	Syngenta Canada
Dichlorprop-D	dichlorprop : 2,4-D E	300 : 282 g/L EC	IPCO
Dichlorprop-DX	dichlorprop-P : 2,4-D E	210 : 400 g/L EC	IPCO
Distinct	dicamba : diflufenzopyr	50 : 20% DG	BASF Canada
Dual II Magnum	metolachlor	915 g/L EC	Syngenta Canada
DyVel	dicamba : MCPA K	84 : 336 g/L SN	BASF Canada
DyVel DSp	dicamba : mecoprop-p : 2,4-D A	110 : 80 : 295 g/L SN	BASF Canada
Eclipse III	glyphosate DMA + clopyralid	480 g/L + 360 g/L SN	Dow AgroSciences
Edge Granular	ethalfluralin	5% G	Dow AgroSciences
Embutox 625	2,4-DB	625 g/L EC	Nufarm Agriculture
Eptam-8E	EPTC	800 g/L EC	Gowan Company
Equinox	tepraloxydim	200 g/L EC	BASF Canada
Escort	metsulfuron methyl	60% DG	E.I. duPont Canada
Estaprop Plus	dichlorprop : 2,4-D E	300 : 282 g/L EC	Nufarm Agriculture
Estaprop XT	dichlorprop-P : 2,4-D E	210 : 400 g/L EC	Nufarm Agriculture
Everest	flucarbazone	66% DG	Arysta LifeScience
Everest GBX	flucarbazone + fluroxypyr	66% DG + 180 g/L EC	Arysta LifeScience
Express Pro	tribenuron methyl : metsulfuron	42.9% : 8.6% SG	E.I. duPont Canada
Express SG	tribenuron methyl	50% SG	E. I. duPont Canada
Factor 540	glyphosate K^{+} salt	540 g/L SN	IPCO
FirstStep Complete	tribenuron methyl + glyphosate	75% DG + 540 g/L SN	Viterra
FlaxMax DLX	tepraloxydim + clopyralid : MCPA E	200 g/L EC + 50 : 280 g/L EC	BASF Canada
Flurox 2,4	fluroxypyr + 2,4-D E	180 g/L EC + 660 g/L EC	Nufarm Agriculture
Foothills NG	clodinafop-propargyl	60 g/L EC	Viterra
Fortress	triallate : trifluralin	10% : 4% G	Gowan Canada
Frontier Max	dimethanamid - P	720g/L EC	BASF Canada
Frontline XL	florasulam : MCPA ester	4 : 280 g/L EC	Dow AgroSciences
Frontline 2,4-D XC	florasulam + 2,4-D E	50 g/L SC + 660 g/L EC	Dow AgroSciences
Gladiator	imazethapyr	240 g/L SN	Univar Canada
Glyfos	glyphosate IPA salt	360 g/L SN	Cheminova Canada
Glyphogan	glyphosate IPA salt	356 g/L SN	MANA Canada
Gramoxone	paraquat	200 g/L SN	Syngenta Canada
Grazon	picloram : 2,4-D E	65 : 240 g/L SN	Dow AgroSciences
Harmony K	clodinafop propargyl + thifensulfuron methyl : tribenuron methyl + dicamba	128 g/L EC + 33.35% : 16.65% SG + 480 g/L SN	E. I. duPont Canada
Harmony K *(with Harmony Broadleaf)*	clodinafop propargyl + thifensulfuron methyl : tribenuron methyl : dicamba	128 g/L EC + 7.7% : 3.9% : 54% DG	E I duPont Canada
Harmony Max	clodinafop propargyl + thifensulfuron methyl : tribenuron methyl +fluroxypyr	128 g/L EC + 33.35% : 16.65 SG + 180 g/L EC	E I duPont Canada
Harmony SG	clodinafop propargyl + thifensulfuron methyl : tribenuron methyl	128 g/L EC + 33.35% : 16.65 SG	E. I. duPont Canada
Hawkeye Power	dicamba (dimethylamine salt)	480 g/L SN	Adjuvants Plus (Gharda)
Heat	saflufenacil	70% WSG	BASF Canada
Horizon 240 EC	clodinafop-propargyl	240 g/L EC	Syngenta Canada
Horizon NG	clodinafop-propargyl	60 g/L EC	Syngenta Canada
Infinity	pyrasulfotole : bromoxynil	37.5 : 210 g/L EC	Bayer CropScience
Kerb 50W SP	propyzamide	50% WP	Dow AgroSciences
Koril 235	bromoxynil	235g/L EC	Nufarm Agriculture
Knockout Extra	glyphosate IPA salt	360 g/L SN	Great Northern Growers
Ladder	clodinafop-propargyl	240 g/L EC	MANA Canada Inc.
Lajj Plus	glyphosate IPA salt	360 g/L SN	Ray Glenn Commodities
Leader	bromoxynil : 2,4-D E	225 : 225 g/L EC	IPCO
Legend	clodinafop-propargyl	240 g/L EC	IPCO
Liberty	glufosinate ammonium	150 g/L SN	Bayer CropScience
Liberty 200 SN	glufosinate ammonium	200 g/L SN	Bayer CropScience
Linuron 400	linuron	400 g/L SC	UAP
Logic M	bromoxynil : MCPA E	225 : 225 g/L EC	IPCO
Lontrel 360	clopyralid	360 g/L SN	Dow AgroSciences
Lorox L	linuron	480 g/L SC	Tessenderlo Kerley Inc.
Marengo	tralkoxydim	400 g/L SC	Dow AgroSciences
Matrix	glyphosate DMA salt	480 g/L SN	IPCO
Maverick III	glyphosate DMA salt	480 g/L SN	Dow AgroSciences
MCPA	MCPA	300,400,500,564 g/L SN, EC	Various
Mecoprop-P	mecoprop-P	150 g/L SN	UAP
Mextrol 450	bromoxynil : MCPA E	225 : 225 g/L EC	Nufarm Agriculture
Momentum	clopyralid : fluroxypyr	90 : 90 g/L EC	Viterra
MPower Glyphosate	glyphosate IPA salt	360 g/L SN	Farmers of North America
MPower HellCat	fenoxaprop-p-ethyl	120 g/L EC	Farmers of north America
MPower Kamikaze	imazethapyr	240 g/L SN	Farmers of North America
MultiStar	imazethapyr	240 g/L SN	Viterra
Muster Toss-N-Go	ethametsulfron-methyl	75% DG	E. I. duPont Canada

Product	***Common Name***	***Formulation***	***Company***
NextStep NG	clodinafop-propargyl	60 g/L EC	Arysta LifeScience
Nimble	thifensulfuron methyl : tribenuron methyl	50% : 25% DG	Cheminova Canada
Nuance	tribenuron-methyl	75% DG	Cheminova Canada
Nufarm Clodinafop	clodinafop-propargyl	240 g/L EC	Nufarm Agriculture
NuGlo	glyphosate IPA salt	450 g/L SN	Nufarm Agriculture
OcTTain XL	fluroxypyr : 2,4-D E	90 : 360 g/L EC	Dow AgroSciences
Odyssey	imazamox : imazethapyr	35% : 35% DG	BASF Canada
Odyssey DLX	imazamox : imazethapyr + tepraloxydim	35% : 35% DG + 200 g/L EC	BASF Canada
Optica Trio	MCPA A : mecoprop-P : dichlorprop-P	160 : 130 : 310 g/L SN	UAP
Option 35 DF	foramsulfuron	35% DG	Bayer CropScience
Option 2.25 OD	foramsulfuron	22.5 g/L OD	Bayer CropScience
Oracle	dicamba (dimethylamine salt)	480 g/L SN	Adjuvants Plus (Gharda)
Overdrive	dicamba : diflufenzopyr	50% : 20% DG	Engage Agro (BASF)
Pardner	bromoxynil	280 g/L EC	Bayer CropScience
Phantom	imazethapyr	240 g/L SN	MANA Canada
Pinnacle SG	thifensulfuron methyl	50% WSG	E. I. duPont Canada
Poast Ultra	sethoxydim	450 g/L EC	BASF Canada
Polaris	glyphosate IPA salt	360 g/L SN	E.I. DuPont Canada
PrePare	flucarbazone	66% DG	Arysta LifeScience
PrePare Complete	flucarbazone + glyphosate	66% DG + 540 g/L	Viterra
PrePass XC	glyphosate DMA + florasulam	480 g/L SN + 50 g/L SC	Dow AgroSciences
Prestige XC	fluroxypyr + clopyralid : MCPA E	333 g/L + 50 : 280 g/L EC	Dow AgroSciences
Primextra II Magnum	metolachlor : atrazine	400 : 320 g/L SC	Syngenta Canada
Princep Nine T	simazine	90% DG	True North
Prism SG	rimsulfuron	25% SG	E.I. DuPont Canada
Pulsar	dicamba : fluroxypyr	87 : 113 g/L EC	Syngenta Canada
Puma^{120} Super	fenoxaprop-p-ethyl	120 g/L EC	Bayer CropScience
Puma Advance	fenoxaprop-p-ethyl	90 g/L EC	Bayer CropScience
Pursuit	imazethapyr	240 g/L SN	BASF Canada
Reclaim	aminopyralid : metsulfuron-methyl+ 2,4-D E	52.5% : 9.45% DG+ 564 g/L EC	Dow AgroSciences
Refine M	thifensulfuron methyl : tribenuron methyl + MCPA E	33.35% : 16.65% SG + 500 or 600 g/L EC	E. I. duPont Canada
Refine SG	thifensulfuron methyl : tribenuron methyl	33.35% : 16.65% SG	E. I. duPont Canada
Reflex	fomesafen	240 g/L SN	Syngenta Canada
Reglone Desiccant	diquat	240 g/L SN	Syngenta Canada
Restore	aminopyralid + 2,4-D A	240 g/L + 564 g/L SN	Dow AgroSciences
Retain	thifensulfuron methyl : tribenuron methyl+fluroxypyr+2,4-D E	50% : 25% DG + 180 g/L EC + 564 g/L EC	Viterra
Reward	diquat	240 g/L SN	True North
Rival	trifluralin	500 g/L EC, 10% G	Nufarm Agriculture
Roundup Transorb HC	glyphosate K+ salt	540 g/L SN	Monsanto
Roundup WeatherMax/Ultra 2	glyphosate K+ salt	540 g/L SN	Monsanto
R/T 540	glyphosate K+ salt	540 g/L SN	Monsanto
Rustler	glyphosate IPA + dicamba	194 g/L + 46 g/L SN	Monsanto
Salvo	2,4-D LV Ester	660 g/L EC	UAP
Select	clethodim	240 g/L EC	Arysta LifeScience
Sencor	metribuzin	75% DG	Bayer CropScience
Shadow RTM	clethodim	240 g/L EC	Viterra
Sharpshooter	glyphosate IPA salt	356 g/L SN	UAP
Sharpshooter Plus	glyphosate IPA salt	360 g/L SN	UAP
Sierra	flucarbazone	66% DG	Syngenta Canada
Signal	clodinafop-propargyl	240 g/L EC	Nufarm Agriculture
Signal D	clodinofop propargyl + bromoxynil : 2,4-D E	240 g/L EC + 225 : 225 g/L EC	Nufarm Agriculture
Signal M	clodinofop propargyl + bromoxynil : MCPA E	240 g/L EC + 225 : 225 g/L EC	Nufarm Agriculture
Simazine 480	simazine	480 g/L SC	UAP
Simplicity	pyroxsulam	30 g/L SC	Dow AgroSciences
Slam'R	clodinafop-propargyl	240 g/L EC	AgWest
Solo	imazamox	70% DG	BASF Canada
Spectrum	florasulam + clopyralid : MCPA E	50 g/L SC + 50 : 280 g/L EC	Dow AgroSciences
Spike-Up	tribenuron-methyl + glyphosate	75% DG + 540 g/L SN	Nufarm Agriculture
Start Up	glyphosate K+ salt	540 g/L SN	Viterra
Stellar	florasulam + fluroxypyr	2.5 g/L SC + 100 g/L EC	Dow AgroSciences
Sword	dicamba : mecoprop : MCPA A	62.5 : 62.5 : 275 g/L SN	UAP
Takkle	glyphosate IPA + dicamba	140 g/L + 70 g/L SN	Syngenta Canada
Tandem	pyrosulam + fluroxypyr	30 g/L OD + 333 g/L EC	Dow AgroSciences
Target	dicamba : mecoprop-P : MCPA A	62.5 : 62.5 : 275 g/L SN	Syngenta Canada
Tensile	imazamox + clopyralid	70% DG + 75% DG	BASF Canada
Thrasher	bromoxynil : 2,4-D E	225 : 225 g/L EC	MANA Canada
Thumper	bromoxynil : 2,4-D E	280 : 280 g/L EC	Bayer CropScience

Product	*Common Name*	*Formulation*	*Company*
Titanium	tralkoxydim + bromoxynil : 2,4-D E	400 g/L SC + 225 : 225 g/L EC	Nufarm Agriculture
Topside	MCPB : MCPA A	375 : 25 g/L SN	UAP
Tordon 22K	picloram	240 g/L SN	Dow AgroSciences
Touchdown Total	glyphosate K+ salt	500 g/L SN	Syngenta Canada
Tracker XP	dicamba : mecoprop-P : MCPA	62.5 : 62.5 : 275 g/L SN	IPCO
Traxion	glyphosate K+ salt	500 g/L SN	Syngenta Canada
Traxos	pinoxaden : clodinafop-propargyl	25 : 25 g/L EC	Syngenta Canada
Treflan	trifluralin	480 g/L EC	Dow AgroSciences
TriCor	metribuzin	75% DG	United Phosphorus Inc.
Triton C	tribenuron methyl : thifensulfuron methyl : quinclorac	5.15% : 10.3% : 51.55% SG	E. I. duPont Canada
Triton K	tribenuron methyl + dicamba + 2,4-D E or tribenuron methyl : dicamba + 2,4-D E	50% SG + 480g/L SN + 660g/L EC or 8.25% : 58.45% DG + 660g/L EC	E. I. duPont Canada
Trophy 600	fluroxypyr + MCPA E	180 g/L + 600 g/L EC	Nufarm Agriculture
Tropotox Plus	MCPB : MCPA A	375 : 25 g/L SN	Nufarm Agriculture
Tundra	fenoxaprop-p-ethyl : bromoxynil : pyrasulfotole	46 : 87.5 : 15.5 g/L EC	Bayer CropScience
Turboprop	dichlorprop : 2,4-D E	300 : 282 g/L EC	UAP
Ultim	nicosulfuron : rimsulfuron	37.5% : 37.5% DG	E.I. duPont Canada
Valtera	flumioxazin	51% DG	Valent Canada
Vantage Plus Max II	glyphosate DMA salt	480 g/L SN	Dow AgroSciences
Varro	thiencarbazone-methyl	10 g/L SC	Bayer CropScience
Velocity All-in-One	thiencarbazone-methyl : pyrasulfotole : bromoxynil	5 : 31.3 : 175 g/L SC	Bayer CropScience
Velpar DF	hexazinone	75% DG	E I duPont Canada
Vigil	fenoxaprop-p-ethyl	120 g/L EC	IPCO
Viper ADV	imazamox : bentazon	20 g/L : 429 g/L SN	BASF Canada
VMD 480	dicamba (dimethylamine salt)	480 g/L SN	Adjuvants Plus (Gharda)
WildCat	fenoxaprop-p-ethyl	120 g/L EC	Viterra
Wise-Up	glyphosate IPA salt	356 g/L SN	Adjuvants Plus
Yuma GL	quizalofop-p-ethyl	96 g/L EC	Gowan Canada

Fungicides

Product	*Common Name*	*Formulation*	*Company*
Acapela	picoxystrobin	250 g/L SC	E.I. duPont Canada
Acrobat 50 WP	dimethomorph	50% WP	BASF Canada
Allegro 500F	fluazinam	40% SC	Syngenta Canada
Astound	cyprodinil : fludioxonil	37.5% : 25.0% DG	Syngenta Canada
Blanket	azoxystrobin + propiconazole	250 g/L SC + 418 g/L EC	MANA Canada
Bravo 500	chlorothalonil	500 g/L SC	Syngenta Canada
Bravo Zn	chlorothalonil	500 g/L SC	Syngenta Canada
Bumper 418 EC	propiconazole	418 g/L EC	MANA Canada
Cabrio Plus	pyraclostrobin : metiram	5% : 55% DG	Engage Agro Corporation
Caramba	metconzole	90 g/L F	BASF Canada
Contans	*Coniothyrium minitans* strain	5.30% DG	UAP
Copper 53W	tribasic copper sulphate	53% WP	UAP
Copper Spray	copper oxychloride	50% WP	UAP
Curzate 60 DF	cymoxanil	60% DF	E.I. duPont Canada
Dithane DG Rainshield NT	mancozeb	75% DG	Dow AgroSciences
Echo 720	chlorothalonil	720 g/L SC	UAP
Echo 90DF	chlorothalonil	90% DF	UAP
Folicur 423 F	tebuconazole	432 g/L F	Bayer CropScience
Folicur 250 EW	tebuconazole	250 g/L EW	Bayer CropScience
Fuse	tebuconazole	432 g/L SC	Syngenta Canada
Gavel 75 DF	mancozeb : zoxamide	67% : 8% DF	Gowan Canada
Headline DUO ONE	boscalid : pyraclostrobin	25.2% : 12.8% DG	BASF Canada
Headine DUO TWO	boscalid	70% DG	BASF Canada
Headline EC	pyraclostrobin	250 g/L EC	BASF Canada
Inspire	difenoconazole	250 g/L EC	Syngenta Canada
Kocide 2000	copper hydroxide	35% DF	E.I. duPont Canada
Kumulus DF	sulphur	80% DG	BASF Canada
Lance WDG	boscalid	70% DG	BASF Canada
MANA Azoxystrobin	azoxystrobin	250 g/L SC	MANA Canada
Manzate Pro-Stick	mancozeb	75% DF	United Phosporus Inc.
Palliser	tebuconazole	432 g/L SC	Viterra
Parasol WG	copper hydroxide	50% DG	Nufarm Agriculture
Penncozeb 75 DF	mancozeb	75% DG	UAP
Phostrol	mono- and dibasic sodium , potassium, and ammonium phosphites	53.6% F	Engage Agro Corporation
Pivot 418 EC	propiconazole	418 g/L EC	IPCO
Polyram DF	metiram	80% DG	BASF Canada
Priaxor DS	fluxapyroxad : pyraclostrobin	250 : 250 g/L SC	BASF Canada
Proline 480 SC	prothioconazole	480 g/L SC	Bayer CropScience

Product	*Common Name*	*Formulation*	*Company*
Propel	propiconazole	250 g/L EC	Viterra
Prosaro 250 EC	prothioconazole : tebuconazole	125 : 125 g/L EC	Bayer CropScience
Quadris	azoxystrobin	250 g/L SC	Syngenta Canada
Quilt	azoxystrobin : propiconazole	75 : 125 g/L SC	Syngenta Canada
Ranman 400 SC	cyazofamid	400 g/L SC	Syngenta Canada
Reason 500SC	fenamidone	500 g/L SC	Bayer CropScience
Regalia Maxx	*Reynoutria sachalienesis*	20% SC	Engage Agro Corporation
Revus	mandipropamid	250 g/L	Syngenta Canada
Revus Top	mandipropamid + difenoconazole	250 g/L SC + 250 g/L EC	Syngenta Canada
Ridomil Gold 480EC/480 SL	metalaxyl-M	480 g/L EC, 480 g/L SC	Syngenta Canada
Ridomil Gold/Bravo/ Ridomil Gold SL/Bravo	metalaxyl-M + chlorothalonil	480 g/L + 500 g/L SC	Syngenta Canada
Rovral Flo	iprodione	240 g/L SC	Bayer CropScience
Rovral RX	iprodione	240 g/L SC	Monsanto
Scala SC	pyrimethanil	400 g/L SC	Bayer CropScience
Senator 70WP	thiophanate-methyl	70% WP	Engage Agro Corporation
Serenade Max/Serenade ASO	*Bacillus subtilis*	14.6% WP / 13.4% SC	UAP
Stratego 250EC	propiconazole : trifloxystrobin	125 : 125 g/L EC	Bayer CropScience
Tanos 50 DF	famoxadone : cymoxanil	25% : 25% DF	E.I. duPont Canada
Tattoo C	propamocarb : chlorothanlonil	375 : 375g/L SC	Bayer CropScience
Tilt 250E	propiconazole	250 g/L EC	Syngenta Canada
Torrent 400SC	cyazofamid	400 g/L SC	Engage Agro Corporation
Twinline	pyraclostrobin : metconazole	130 : 80 g/L F	BASF Canada
Vertisan	penthiopyrad	200 g/L EC	E.I. duPont Canada
Zampro	dimethomorph : ametoctradin	225 : 300 g/L SC	Engage Agro Corporation

Seed Treatments

Product	*Common Name*	*Formulation*	*Company*
Acceleron Seed Treatment Package	Bacillus subtilis + thiamethoxam : difenoconazole : metalaxyl-M : fludioxonil	0.18% + 20.7% : 1.25% : 0.39% : 0.13% FS	Monsanto
Admire SPT	imidacloprid	240 g/L FS	Bayer CropScience
Agrox B-2	captan : diazinon	33.5% : 11% WP	Norac Concepts Inc.
Agrox CD	captan : diazinon	15% : 15% DS	Norac Concepts Inc.
Agrox FLn	captan	30% FS	Norac Concepts Inc.
Alias 240 SC	imidacloprid	240 g/L FS	MANA Canada
Allegiance FL	metalaxyl	317 g/L FS	Bayer CropScience
Apron Advance	fludioxonil : metalaxyl-M : thiabendazole	25 : 20 : 150 g/L FS	Syngenta Canada
Apron Maxx RFC	fludioxonil : metalaxyl-M	2.31% : 3.46% FS	Syngenta Canada
Apron Maxx RTA	fludioxonil : metalaxyl-M	0.73% : 1.10% FS	Syngenta Canada
Armour	triticonazole	25 g/L FS	Viterra
Armour RTU	triticonazole	16.8 g/L FS	Viterra
Belmont 2.7FS	metalaxyl	317 g/L FS	Chemtura Canada Co.
Charter RTU	triticonazole	16.8 g/L FS	BASF Canada
Confine	mono and di-potassium salts of phosphoric acid	45.8% F	Winfield Solutions
Crown	carbathiin : thiabendazole	92 : 58 g/L LS	Chemtura Canada Co.
Cruiser 5FS	thiamethoxam	47.6% FS	Syngenta Canada
Cruiser Maxx Beans	thiamethoxam : metalaxyl-M : fludioxonil	22.6% : 1.70% : 1.12% FS	Syngenta Canada
Cruiser Maxx Cereals/ Cruiser Maxx Cereals Commercial	thimethoxam : difenoconazole : metalaxyl-M	2.80% : 3.36% : 0.56% FS	Syngenta Canada
Cruiser Maxx D Potatoes	fludioxonil : difenoconazole + thiamethoxam	19.4 : 19.4 g/L + 240 g/L FS	Syngenta Canada
Cruiser Maxx Pulses	thiamethoxam + fludioxonil : metalaxyl-M	47.6% + 0.73% (or 2.31%) : 1.10% (or 3.46%) FS	Syngenta Canada
Cruiser Maxx Vibrance Beans	thiamethoxam : metalaxyl-M : fludioxonil + sedaxane	22.6% : 1.70% : 1.12% + 500 g/L FS	Syngenta Canada
Cruiser Maxx Vibrance Cereals	thiamethoxam : difenoconazole : metalaxyl-M : sedaxane	30.7 : 36.9 : 9.5 : 8.0 g/L FS	Syngenta Canada
DB-Red L	maneb	323 g/L F	UAP
DCT	diazinon : captan : thiophanate-methyl	6% : 18% : 14% DS	Norac Concepts Inc.
Dividend XL RTA	difenoconazole : metalxyl-M	3.37% : 0.27% FS	Syngenta Canada
Gaucho CS FL	imidacloprid : carbathiin : thiram	285.7 : 47.6 : 95.3 g/L FS	Bayer CropScience
Gemini	triticonazole : thiram	1.25% : 12.5% FS	BASF Canada
General Storage Disinfectant	dimethyl benzyl ammonium chloride	10% F	UAP
Helix Vibrance	thiamethoxam : difenoconazole : metalaxyl-M : fludioxonil + sedaxane	20.7% : 1.25% : 0.39% : 0.13% + 500 g/L FS	Syngenta Canada
Helix XTra	thiamethoxam : difenoconazole : metalaxyl-M : fludioxonil	20.7% : 1.25% : 0.39% : 0.13% FS	Syngenta Canada
Kocide 2000	copper hydroxide	35% DF	E.I. duPont Canada
Maxim D	fludioxonil : difenoconazole	19.4 : 19.4 g/L FS	Syngenta Canada
Maxim Liquid PSP	fludioxonil	40.3% F	Syngenta Canada
Maxim MZ PSP	fludioxonil : mancozeb	0.5% : 5.7% DS	Syngenta Canada

Product	***Common Name***	***Formulation***	***Company***
Maxim PSP	fludioxonil	0.5% DS	Syngenta Canada
Maxim Quattro	thiabendazole : fludioxonil : metalaxyl-M : azoxystrobin	26.5% : 3.32% : 2.65% : 1.33 % FS	Syngenta Canada
Mertect SC	thiabendazole	500 g/L SC	Syngenta Canada
Polyram 16D	metiram	16% DS	BASF Canada
Poncho 600 FS	clothianidin	600 g/L FS	Bayer CropScience
Potato ST 16	mancozeb	16% DS	UAP
Proseed	fludioxonil	40.3% LS	Syngenta Canada
Prosper EverGol	clothianidin : penflufen : trifloxystrobin : metalaxyl	290 : 10.7 : 7.15 : 7.15 g/L FS	Bayer CropScience
Prosper FX	clothianidin : carbathiin : trifloxystrobin : metalaxyl	285.7 : 50 : 7.14 : 5.36 g/L FS	Bayer CropScience
Rancona Apex	ipconazole	4.61 g/L FS	Chemtura Canada Co.
Rancona RS	ipconazole : carbathiin	9.38 : 87.5 g/L FS	Chemtura Canada Co.
Raxil MD	tebuconazole : metalaxyl	5.0 : 6.6 g/L FS	Bayer CropScience
Raxil T	tebuconazole : thiram	6.7 : 222 g/L F	Bayer CropScience
Raxil WW	tebuconazole : metalaxyl + imidacloprid	5.0 : 6.6 + 480 g/L FS	Bayer CropScience
Senator PSPT	thiophanate-methyl	10% DS	Engage Agro Corporation
Solan MZ	mancozeb	16% DS	Norac Concepts Inc.
Sombrero 600 FS	imidacloprid	600 g/L FS	MANA Canada
StorOx	hydrogen peroxide	27% LS	Brenntag Canada
Thiram 75WP	thiram	75% WP	Chemtura Canada Co.
Titan ST	clothianidin	600 g/L FS	Bayer CropScience
Trilex AL	trifloxystrobin : metalaxyl	13.5 : 10.8 g/L FS	Bayer CropScience
Tuberseal	mancozeb	16% DS	Norac Concepts Inc.
Vibrance 500FS	sedaxane	500 g/L FS	Syngenta Canada
Vibrance XL	difenoconazole : metalaxyl-M : sedaxane	66.2 : 16.5 : 13.8 g/L FS	Syngenta Canada
Vibrance XL Co-Pack	difenoconazole : metalaxyl-M + sedaxane	3.37% : 0.27% + 500 g/L FS	Syngenta Canada
Vitaflo 220	carbathiin : thiram	220 : 200 g/L FS	Chemtura Canada Co.
Vitaflo 280	carbathiin : thiram	15.59% : 13.25% FS	Chemtura Canada Co.
Vitaflo Fungicide	carbathiin : thiram	15.59% : 13.25% FS	Viterra
Vitaflo SP Fungicide	carbathiin: thiram	15.59% : 13.25% FS	IPCO

Insecticides

Product	***Common Name***	***Formulation***	***Company***
Actara 240 SC/Actara 25 WG	thiamethoxam	240 g/L SC, 25% DG	Syngenta Canada
Admire 240 / SPT	imidacloprid	240 g/L SC	Bayer CropScience
Alias 240 SC	imidacloprid	240 g/L SC	UAP
Ambush	permethrin	500 g/L EC	Amvac Chemical Corp.
Assail	acetamiprid	70% WP	E.I. duPont Canada
Beleaf	flonicamid	50% DG	UAP
Citadel 480EC	chlorpyrifos	480 g/L EC	IPCO
Clutch	clothianidin	50% DG	Valent Canada Inc.
Concept	imidacloprid : deltamethrin	75 g/L SC : 10 g/L SC	Bayer CropScience
Coragen	chlorantraniliprole	200 g/L SC	E.I. duPont Canada
Cygon 480EC / Cygon 480-Ag	dimethoate	480 g/L EC	IPCO, Cheminova Canada
Decis	deltamethrin	50 g/L EC	Bayer CropScience
Delegate	spinetoram	25% SG	Dow AgroSciences
Diazinon	diazinon	50% L, 50% EC, 50% WP	UAP, IPCO
Dibrom	naled	864 g/L EC	UAP
Dipel 2X DF	*Bacillus thuringiensis*	32 billion CLU/kg DG	Valent BioSciences
Eco Bran	carbaryl	2% spreadable bran bait	Peacock Industries
Entrust	spinosad	80% WP	Dow AgroSciences
Fulfill	pymetrozine	50% DG	Syngenta Canada
Furadan	carbofuran	480 g/L SC	Bayer CropScience
Grapple / Grapple$_2$	imidacloprid	240 g/L SC	Cheminova Canada
Imidan	phosmet	50% WP	UAP
Insecto	diatomaceous earth	90%	Natural Insecto Products Inc.
Lagon 480E	dimethoate	480 g/L EC	UAP
Lannate	methomyl	90% WSP	E.I. duPont Canada
Lorsban 4E	chlorpyrifos	480 g/L EC	Dow AgroSciences
Malathion 85E / 500	malathion	85%, 500 g/L EC	UAP, IPCO
Matador	lambda-cyhalothrin	120 g/L EC	Syngenta Canada *Monitor*
methamidophos	480 g/L L	Bayer CropScience, UAP	
Movento 240 SC	spirotetramat	240 g/L SC	Bayer CropScience
Nolo Bait	spores of *Nosema (Paranosema) locustae Canning*	Minimum of $2.2x10^6$ on coated wheat bran	M&R Durango, Inc.
Nufos 4E	chlorpyrifos	480 g/L EC	Cheminova Canada
Oberon	spiromesifen	240 g/L SC	Bayer CropScience
Orthene	acephate	75% WSP	UAP
Perm-UP	permethrin	384 g/L EC	United Phosphorous Inc
Phostoxin	aluminum phosphide	55% tablets	Degesch America Inc

Pounce	permethrin	384 g/L EC	UAP
Protect-It	diatomaceous earth	90%	Hedley Technologies Ltd
Pyrifos 15G	chlorpyrifos	15% G	UAP
Pyrinex 480EC	chlorpyrifos	480 g/L EC	MANA Canada
Rimon 10 EC	novaluron	10% EC	Chemtura, MANA Canada
Ripcord	cypermethrin	407 g/L EC	BASF Canada
Sevin XLR	carbaryl	480 g/L SC	Bayer CropScience
Silencer 120 EC	lambda-cyhalothrin	120 g/L EC	MANA Canada
Sluggo	ferric phosphate	0.76 % granules	Engage Agro Corp.
Success 480 SC	spinosad	480 g/L SC	Dow AgroSciences
Tempo	cyfluthrin	20% WP	Bayer CropScience
Thimet 15G	phorate	15% G	Amvac Chemical Corporation
Thiodan 4EC	endosulfan	400 g/L EC	Bayer CropScience
Thionex EC / 50 WP	endosulfan	400 g/L EC, 50% WP	UAP
UP-Cyde	cypermethrin	250 g/L EC	United Phosphorous Inc
Vydate L	oxamyl	240 g/L SN (water soluble liquid)	E.I. duPont Canada

Abbreviations

WP	wettable powder	EC	emulsifiable concentrate	WSP	water soluble powder	SN	solution	A	amine
DG	water dispersible granule	G	granule	DF	dry flowable	F	flowable	E	ester
WSG	water soluble granule	SC	suspension concentrate	SG	soluble granule	OD	oil dispersion	LS	solution for seed treatment
DS	powder/dust for dry seed treatment	EW	emulsion, oil in water	FS	flowable suspension concentrate for seed treatment	SL	soluble concentrate		

KEY TO PRODUCT PAGES

Pesticide Product Name

This field lists the pesticide product name. Where there is only one product the commercial "trade" name is given. Where more than one company sells pesticides with the same combination of active ingredients the "generic" (active ingredient) name is given.

If the active ingredients are all in a common formulation (liquid, granule, etc.) the generic name will appear as '*Ingredient A/Ingredient B*' and if the active ingredients are in separate containers to be mixed in the sprayer the names are given as '*Ingredient A + Ingredient B*'.

Pesticide Resistance Group – #

This area will the pesticide active ingredient(s) to the mode of action that ingredient uses and refer to a page number where more information can be found.

Company:

This section identifies the company (or companies) that manufacture or market this crop protection product (or generic equivalents) in Canada as well as the PCP# for that (those) product(s). See page 9 for more information on PCP numbers. PCP#s are given as '*(PCP#XXXXX)*' where XXXXX is a four or five digit number unique to that product. In some cases, where there are multiple components with separate PCP numbers, the PCP number will be provided below under 'Formulation:'

Formulation:

This section gives information on the active ingredient and its concentration in the product as well as information on formulation type and packaging types and configurations. Formulation strength (or concentrations) are given in % by weight for dry formulations and g/L for liquid formulations. PCP numbers may also be give for some products (see above).

Crops and Staging:*

This section indicates on which crops the product may be used and what stage of crop development it should be applied at. Rates may also be included in this section if they vary between crop types or crop stage.

**This section will also indicate which crops are registered under the User Requested Minor Use Label Expansion (URMULE) program. Some companies, as a condition of placing these minor crops on their labels request, that users of their product on these crops do so at their own risk because the registration was approved with information the company did not produce.*

These crops will be flagged separately from the main crops.

Pest (Diseases, Insects, Weeds) and Staging:

This section indicates the pests (Diseases, Insects, or Weeds) that are indicated on the product label as controlled or suppressed, as well as any specifics on the timing of application relative to the pest stage if required. Rates may also be included in this section if they differ for different pests or stage of pest.

Rates:

The rates provided in this section are given in the amount of product required per acre and the number of acres treated per package unit where possible. This section will also indicate any adjuvants that are to be used in conjunction with the product and the rate of that adjuvant.

This section will not be present if rates have been integrated into either of the previous **Crops** or **Pest** sections.

Application Information:

Water Volume: This section indicates the minimum carrier water volume to be used to apply the product. Using less than the recommended minimum carrier application volume can negatively affect pesticide performance, particularly with contact pesticides and when using low drift nozzles.

Nozzles and Pressure: This section indicates if there are any particular nozzles that should or should not be used to apply the product. Pressures indicated reflect those for conventional nozzles. Low drift nozzles may require higher pressures for proper performance. A general statement of "Use nozzles and pressures designed to deliver proper coverage with *ASABE* ____ droplets" indicating the ideal droplet sizes to allow for the combination of lowest drift potential and best performance from the pesticide. ASABE refers to the American Society of Agricultural Engineers who have set standards a series of droplet measurements (in microns or micrometres) that classify droplet sizes from *'fine'* to *'very coarse'*.

How it Works:

This section typically refers to the page where a general description of the various modes of action of either herbicide, fungicides or insecticides.

Effects of Growing Conditions:

This section summarizes any adverse conditions that will affect the biological function of the crop or the target pest and therefore possibly impact the product's performance. In most cases both crop and target pest must be growing or functioning normally for pesticides to provide expected performance and/or crop tolerance. Adverse weather conditions such as extreme heat, cold, drought or flooding can slow or stop the biological processes in the crop or pest. These biological processes in the crop allow the pesticide to be degraded quickly. If biological processes that are attacked by the pesticide, and under normal conditions would kill the pest, are not functioning normally the pest may be able to rid itself of the pesticide before dying and recover from the application.

Tank Mixes:

This section indicates which other pesticides the pesticide label indicates are registered for use as tank mix combinations with this pesticide.

Common mixes may include:

Herbicides:

(Subtitles may indicate specific crops or condition restrictions:)

Insecticides:

Fungicides:

Fertilizers:

There may be additional pesticides that are registered but not listed on this product's label. Other pesticides may have this product listed as a mix option on their labels. The note below **(in bold)** directs users to a chart inside the back cover that show all available mixes for this pesticide. The product listed on the left column of the chart is the product that supports the mix. Mixes supported by both products are marked with an 'X'. Mixes supported by only one of the products is indicated by an arrow pointing to the left column.

Included in the tank mix section in non-bolded italics may be any precautions against the mixing of pesticides which will have adverse reactions such as crop injury, reduced pest control or unusual increased danger in the use of the product.

Note: The above mixes are those listed on the pesticide label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Restrictions:

Since most pesticides have a capacity to injure neighboring plants, wildlife or people, they will come with restrictions on their use in order to prevent this unintentional damage. Misuse of pesticides may result in as little as temporary or superficial damage to plants or a slight irritation to the eyes or nose, or could also result in poor performance of the pesticide, severe injury and/or yield loss to very sensitive plants and/or unacceptable residues in agricultural commodities, and/or serious illness or death of non-target organism or people. It is important to comply with product restrictions in order to minimize the impact of the pesticide used on non-target organisms and people. A selection of common restrictions and precautions found on product labels are provided in this section, ***but it is important to read the label carefully in order to understand how to use the product properly.***

Rainfall: This section indicates the required delay between application and rainfall to avoid reductions in the performance of the product or the unintentional movement of the product.

Re-entry: This section indicates when it is safe for a person to re-enter treated field following an application of a particular pesticide without the same personal protection used to apply the product.

Resistance Management: This section highlights products where an increased risk of the target pests developing resistance to the group of products (typically fungicides) has been identified. If no specific risk has been identified the reader is referred to a general resistance section. All pesticides have some risk of the target pest developing resistance. Rotating pesticide groups using as many different resistance groups as possible in the rotation is one way to avoid or delay resistance development.

Grazing: This section indicates whether and how soon treated crops may be grazed by livestock or otherwise fed to livestock. This restriction is in place to avoid residues of the pesticide from being detected in milk or meat from animals consuming forage, greenfeed or straw from treated crops or forage.

Pre-harvest interval: Is the time that must be left between application of a pesticide and the harvest of a crop in order to prevent greater than allowable residues of the pesticide in the harvested material. Harvest is the cutting of the crop (i.e. combining or hay cut) or removal of the harvestable material from the plant (i.e. picking fruit or striper header). Maximum Residue Limits (MRLs) are set for commodities based on registered rates and staging of pesticides used in the production of those commodities. Disregarding these intervals can result in residues over the MRLs, which can lead to market disruptions.

Re-cropping: This section indicates how soon specific crops may be seeded into treated fields. Failure to adhere to these delays could result in injury to the following crop.

Aerial Application: This section indicates whether the product may be applied by aircraft and any special conditions that may be necessary.

Labelling: In addition to other precautions and warnings, seed treatment products will also have statements about how seed treated with the product should be labeled.

Storage: This section indicates how the product must be stored. As a general rule, unused pesticides should always be stored in their original containers in a secure, dry area, away from other pesticides, food or feed.

Environment: This section will indicate any setback distances that are required from sensitive aquatic or upland habitats. Newer labels may indicate that these distances are from the downwind edge of the boom but older labels may not. Examples of aquatic habitats are lakes, rivers, sloughs, ponds, prairie potholes, creeks, marshes, streams, reservoirs and wetlands. Examples of terrestrial habitats are grasslands, forested areas, shelter belts, woodlots, hedgerows, riparian areas and shrublands.

In addition to the set back or 'buffer' distances indicated on product labels, provincial environment departments may also have additional restrictions or requirements for permits to apply pesticides to or near water. Check with the provincial environment department/ministry for more information.

Tank Cleaning:

This section describes the measures that are required to properly clean out spray tanks. A general overview of sprayer cleaning is given on page 14, but products where there is a high risk of crop damage as a result of very low level contamination of the spray solution, will have specific measures indicated.

Hazard Rating:

This section indicates the relative toxicity of the pesticide, formulations or components. For an explanation of the symbols used here see page 10. An additional symbol that is used that is not a standard symbol is the (!) exclamation mark which indicates an otherwise undefined risk factor (i.e. irritation).

Example:

▽ Caution – Eye Irritant

Some older products have not had hazard ratings developed while others products have very low toxicity and do not have hazard warnings. Even in the absence of a hazard rating users should wear a minimum of nitrile gloves and an apron as well as long sleeved apparel during mixing and avoid unnecessary exposure.

Weed Control

The use of in-crop herbicides to control weeds is often very important in determining the success or failure of a crop. However, many other practices that can be implemented before and after a herbicide application can help to reduce weed competition. The use of these practices is termed Integrated Weed Management.

Integrated Weed Management

A farming system that utilizes an array of inter-dependent cultural, biological and herbicidal weed control practices is implementing Integrated Weed Management (IWM). It is essential that IWM involves an array of tools including the rotation of available herbicide groups, ensuring that weeds are exposed to a diverse range of control mechanisms. The principal aim of IWM is to improve the health and vigour of crops so that they may out-compete weeds emerging in the stand. This helps to reduce selection for resistance to any single control agent and to delay or prevent the development of herbicide resistant weeds.

Practising IWM does not mean abandoning chemical weed control, just relying on it less exclusively. For example:

- You may decide to choose a taller wheat variety or a tall, viny pea variety for a certain field. These crop selections will compete strongly with weeds, possibly allowing you to skip a spray operation in more competitive crops.
- You could insert a short-term forage crop into your crop rotation. Studies show that short-term alfalfa stands can reduce wild oat and green foxtail populations by up to 80 percent the year after breaking.
- Early sown barley may give you enough of a "jump" on the weeds that you can avoid herbicide applications.
- Use of vigorous, high-quality seed, sown shallow, can give you better crop competition than poor-quality or deeply sown crop seed.
- Banding nitrogen near the seed can give your crop an advantage over weeds.

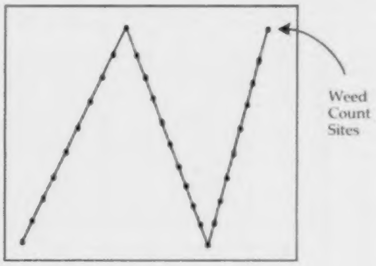
For more information, refer to "Integrated Weed Management: Making it Work on Your Farm" factsheet, available from both Manitoba Agriculture, Food and Rural Initiatives and Saskatchewan Ministry of Agriculture.

Making Spray Decisions

Field Scouting

Field scouting is an important tool for making informed spray decisions. Accurately assessing the type and number of weeds in the field will help you determine if a spray operation is necessary. The scouting pattern diagram on this page provides a guideline for scouting a field. The entire field should be walked to get a feel for the distribution and species of the weeds present. A minimum of 20 weed counts should be taken across the field. A smaller number may be used, but be aware that accuracy decreases as the number of counts gets smaller. Count the number of weeds in a 1 m^2 or a 0.25 m^2 area and divide the total number of weeds by the number of counts taken to obtain an average for the field. If using 0.25 m^2 samples, make sure to multiply by four so your average is for a 1 m^2 area.

Some weeds are not distributed uniformly and may be found in patches (for example, Canada thistle) or in low spots. As well, the type and number of weeds found along the field edges may be very different from those found inside the field. These areas should be considered separate from the rest of the field. If possible, patches, low spots, and field borders should be treated separately, as field wide spraying may not be required. Look out for new invading weeds and patches of herbicide-resistant weeds. Herbicide-resistant weeds and new invaders should be removed (manually if necessary), regardless of their number, to prevent them from spreading and becoming a serious control problem. Mapping your field's weed problems will allow you to monitor the spread of weed patches over time and help you assess the effectiveness of your control program.



Yield Losses Caused by Weeds

Knowing the amount of crop yield loss caused by a given weed density will help you decide if a spray operation is required. The tables on the following pages give an indication of the yield loss caused by some of the important grassy weeds.

THESE TABLES SHOULD BE USED ONLY AS A GUIDE. The figures are based on Western Canadian research trials and will not be accurate all of the time. The yield loss values apply only to healthy, well fertilized crops with good stand establishment. Crops that are diseased or emerged unevenly will not compete well with weeds and will suffer larger yield losses than indicated in these tables. The yield loss figures are based on competition from single weed species only. Other weeds, such as wild mustard or Canada thistle, must be controlled if the figures are to be accurate. As well, the tables are based on competition from normal height crops. Semi-dwarf or hybrid varieties may not compete as well with weeds and the figures may not be accurate in these cases.

Table 1. Yield Losses (Percent) in Wheat Caused by Wild Oats.

	Wild Oat Density – Number Per Square Metre																
	1	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**25**	**30**	**35**	**40**	**45**	**50**
Wild Oats are 1 Leaf Stage Ahead of the Crop	1	2	4	6	8	10	12	14	15	17	19	22	26	29	32	34	37
Wild Oats are the Same Leaf Stage as the Crop	1	1	2	4	5	6	7	8	9	10	11	14	16	18	20	22	24
Wild Oats are 1 Leaf Stage Behind the Crop	0	1	1	2	3	3	4	5	5	6	7	8	10	11	13	14	15

Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Figure 1. Spray Decision Guideline for Wild Oats in Wheat.

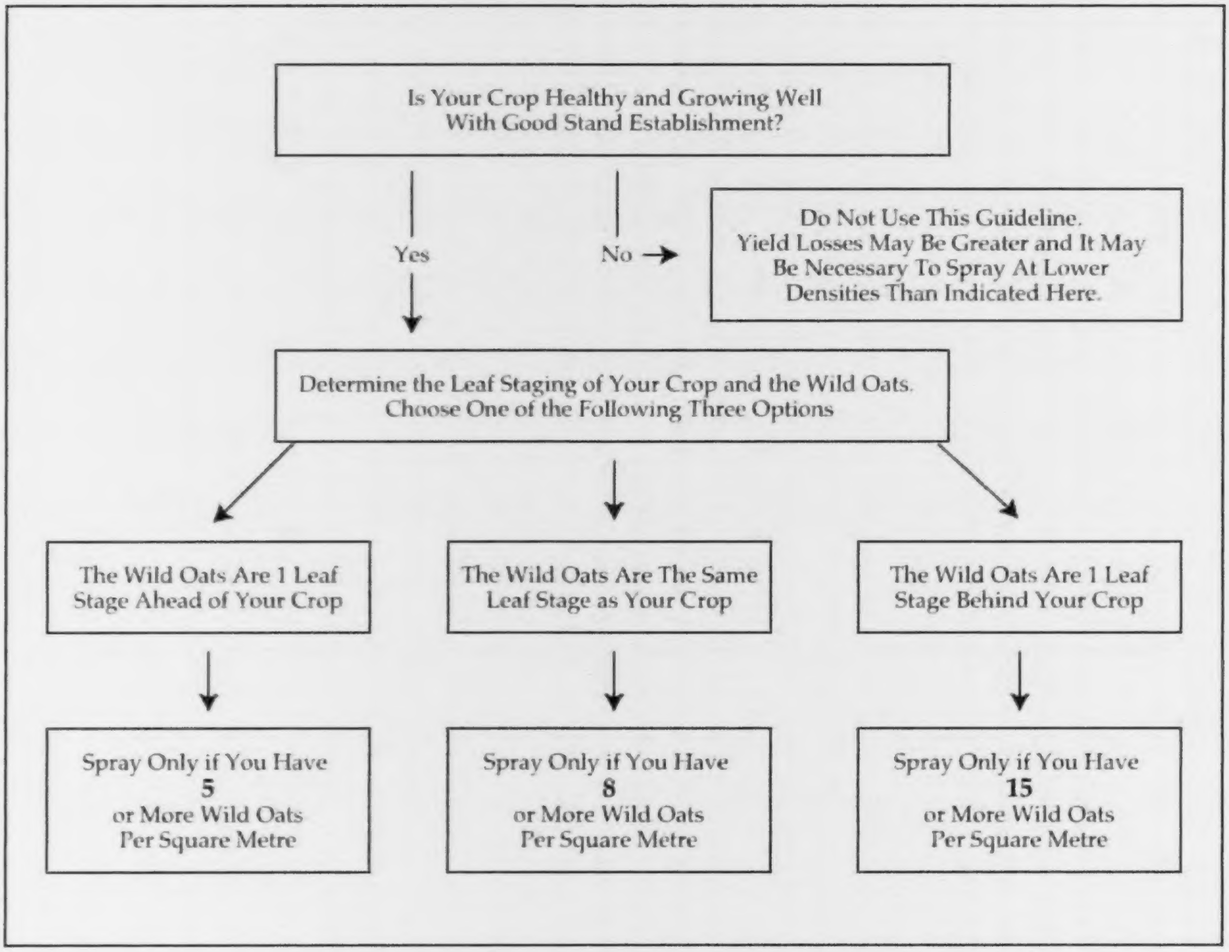
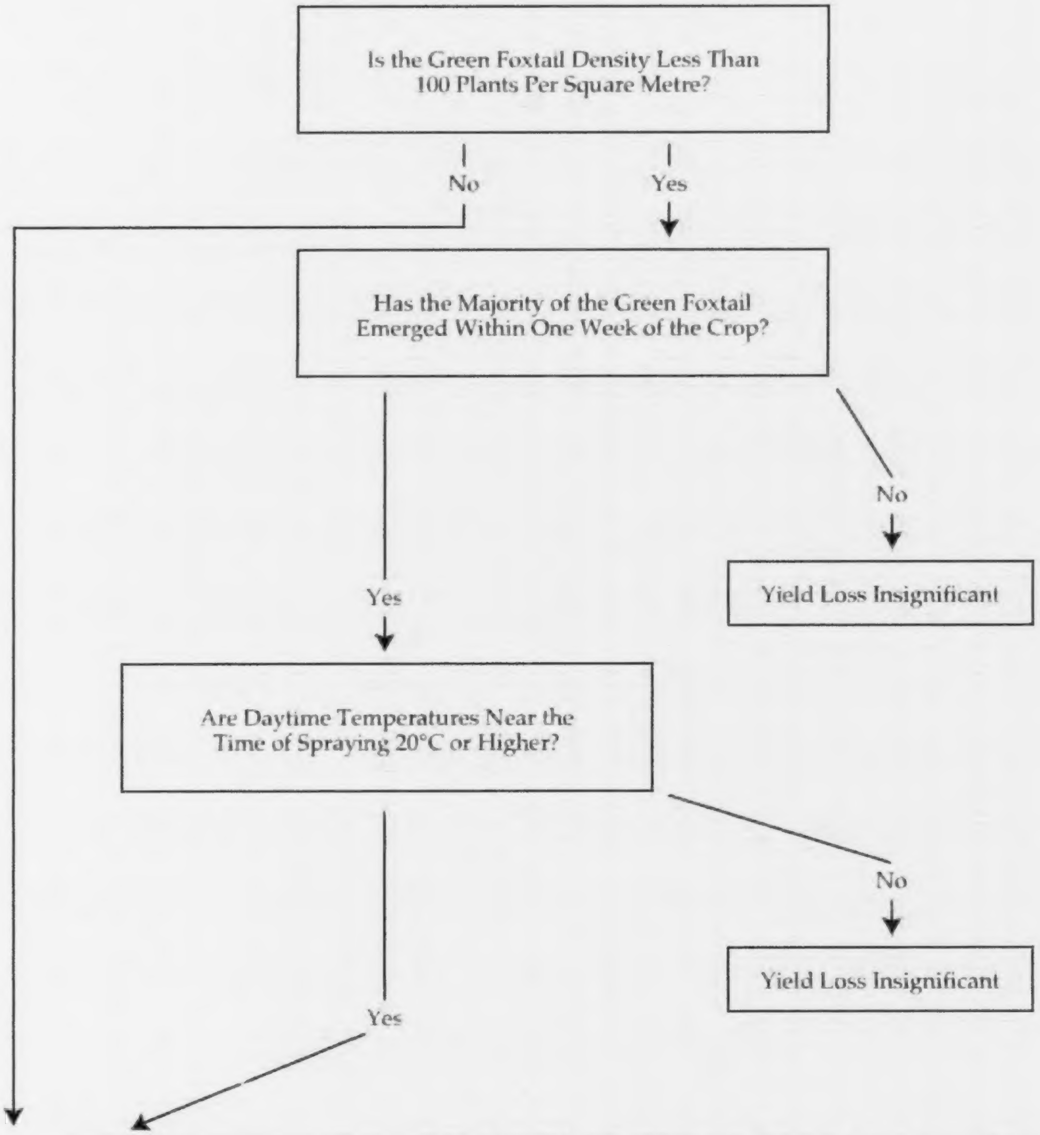

Is Your Crop Healthy and Growing Well With Good Stand Establishment?
Yes
No
Do Not Use This Guideline. Yield Losses May Be Greater and It May Be Necessary To Spray At Lower Densities Than Indicated Here.
Determine the Leaf Staging of Your Crop and the Wild Oats. Choose One of the Following Three Options
The Wild Oats Are 1 Leaf Stage Ahead of Your Crop
The Wild Oats Are The Same Leaf Stage as Your Crop
The Wild Oats Are 1 Leaf Stage Behind Your Crop
Spray Only if You Have 5 or More Wild Oats Per Square Metre
Spray Only if You Have 8 or More Wild Oats Per Square Metre
Spray Only if You Have 15 or More Wild Oats Per Square Metre

Table 2. **Yield Losses (Percent) in Wheat Caused by Green Foxtail (Wild Millet).**


Is the Green Foxtail Density Less Than 100 Plants Per Square Metre?
No
Yes
Has the Majority of the Green Foxtail Emerged Within One Week of the Crop?
No
Yield Loss Insignificant
Yes
Are Daytime Temperatures Near the Time of Spraying 20°C or Higher?
No
Yield Loss Insignificant
Yes

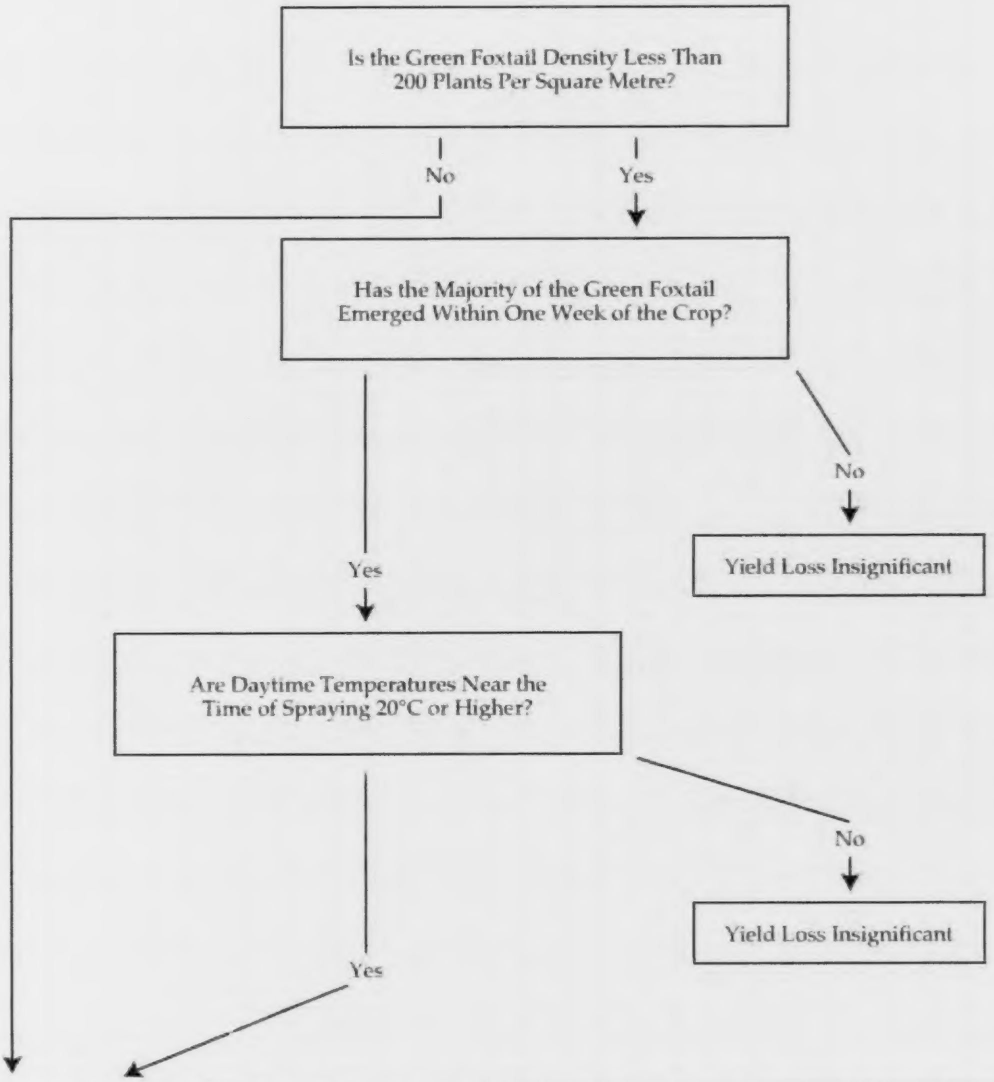
Green Foxtail Density (no. per square metre)	50	75	100	125	150	175	200	250	300	350	400	450	500
Yield Loss (percent)	2	3	5	6	7	8	9	11	14	16	18	20	23

Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Table 3. Yield Losses (Percent) in Barley Caused by Wild Oats.

Crop Density (plants/m^2)	Relative Emergence	Wild Oat Density (plants/m^2)											
		1	5	10	15	20	25	30	40	50	70	100	150
300	Wild Oats are 1 Leaf Stage Ahead of the Crop	0.3	1.4	2.8	4.1	5.4	6.7	8.0	10.3	12.6	16.8	22.4	30.2
	Wild Oats are the Same Leaf Stage as the Crop	0.3	1.3	2.5	3.7	4.8	6.0	7.1	9.2	11.3	15.1	20.3	27.6
	Wild Oats are 1 Leaf Stage Behind the Crop	0.2	0.9	1.7	2.6	3.4	4.2	5.0	6.6	8.1	11.0	15.0	20.9
225	Wild Oats are 1 Leaf Stage Ahead of the Crop	0.4	1.9	3.6	5.4	7.0	8.6	10.2	13.1	15.9	20.9	27.4	36.2
	Wild Oats are the Same Leaf Stage as the Crop	0.3	1.6	3.1	4.6	6.1	7.5	8.8	11.4	13.9	18.4	24.4	32.6
	Wild Oats are 1 Leaf Stage Behind the Crop	0.2	1.0	2.0	3.0	4.0	4.9	5.8	7.6	9.3	12.6	17.1	23.6
175	Wild Oats are 1 Leaf Stage Ahead of the Crop	0.5	2.3	4.6	6.7	8.7	10.7	12.5	16.1	19.3	25.1	32.3	41.8
	Wild Oats are the Same Leaf Stage as the Crop	0.4	1.9	3.8	5.6	7.3	8.9	10.5	13.6	16.4	21.6	28.2	37.1
	Wild Oats are 1 Leaf Stage Behind the Crop	0.2	1.1	2.3	3.4	4.4	5.5	6.5	8.5	10.4	14.0	18.9	25.9

Table 4. Yield Losses (Percent) in Barley Caused by Green Foxtail (Wild Millet).


Is the Green Foxtail Density Less Than 200 Plants Per Square Metre?
No
Yes
Has the Majority of the Green Foxtail Emerged Within One Week of the Crop?
Yes
No
Yield Loss Insignificant
Are Daytime Temperatures Near the Time of Spraying 20°C or Higher?
Yes
No
Yield Loss Insignificant

Green Foxtail Density (no. per square metre)	50	75	100	125	150	175	200	250	300	350	400	450	500
Yield Loss (percent)	1	2	3	3	4	5	6	7	8	10	11	13	14

Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Table 5. Yield Losses (Percent) in Canola Caused by Wild Oats and Volunteer Cereals.

	Weed Density – Number Per Square Metre												
	1	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**25**	**30**
Wild Oats	3	5	6	8	9	10	11	12	13	14	15	16	18
Volunteer Wheat	1	3	6	8	10	11	12	14	15	16	17	19	21
Volunteer Barley	3	5	8	10	12	14	15	17	18	19	20	23	25

Sources: Dew and Keys, Agriculture Canada (Lacombe, Alberta)
O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Figure 2. Spray Decision Guideline for Wild Oats and Volunteer Cereals in Canola.

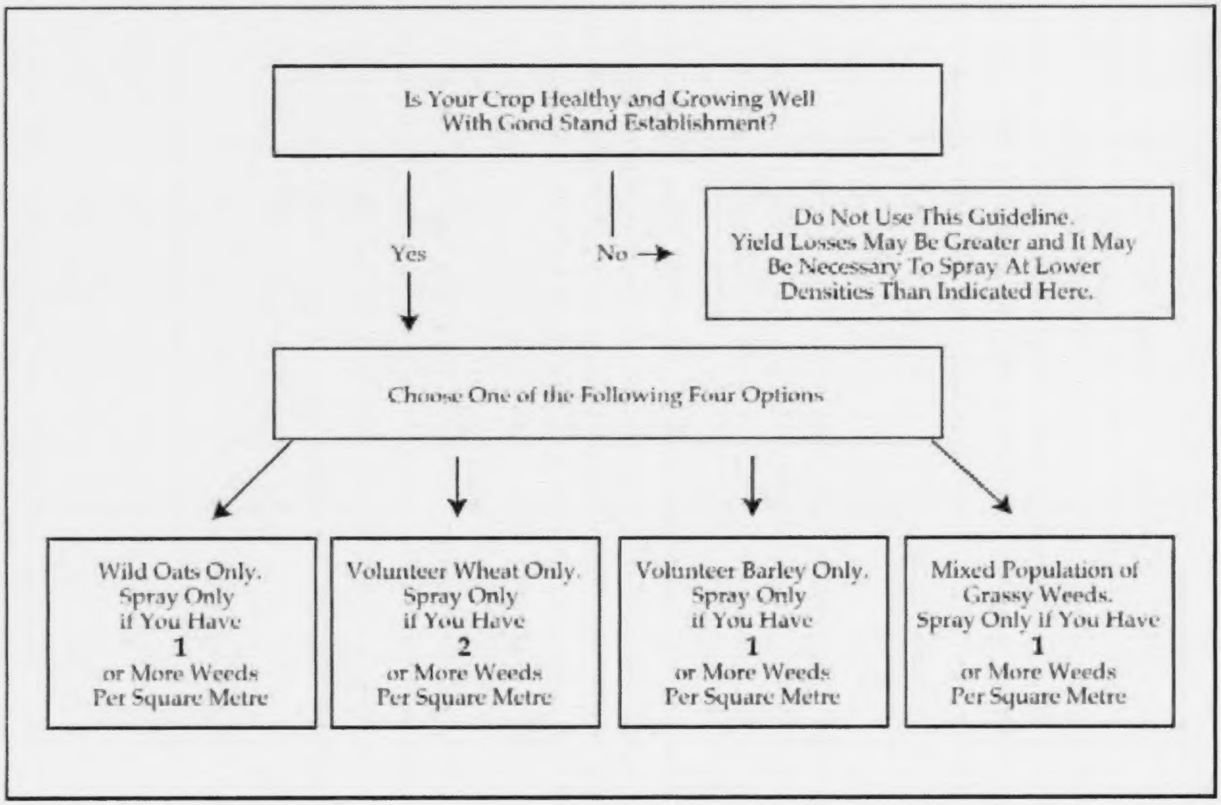
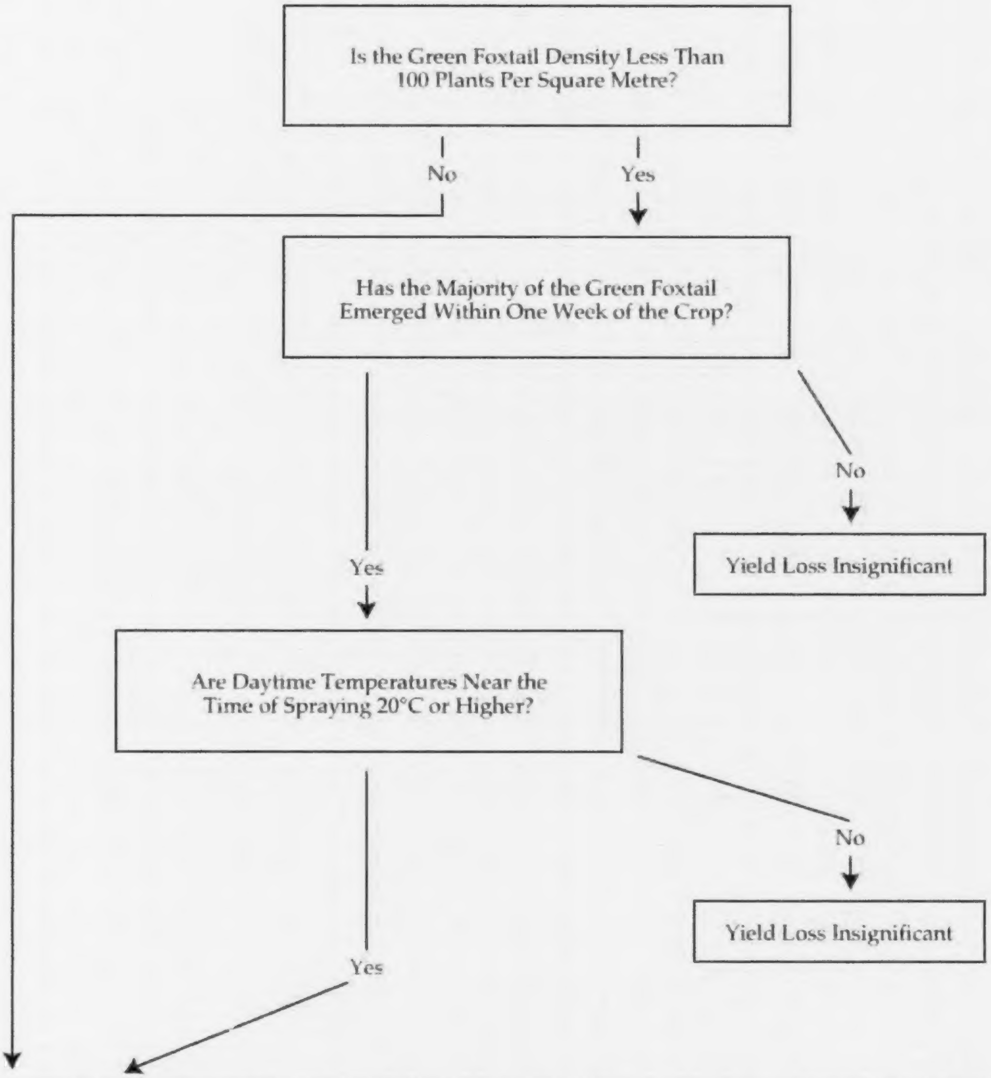

Is Your Crop Healthy and Growing Well
With Good Stand Establishment?
Yes
No
Do Not Use This Guideline.
Yield Losses May Be Greater and It May
Be Necessary To Spray At Lower
Densities Than Indicated Here.
Choose One of the Following Four Options
Wild Oats Only.
Spray Only
if You Have
1
or More Weeds
Per Square Metre
Volunteer Wheat Only.
Spray Only
if You Have
2
or More Weeds
Per Square Metre
Volunteer Barley Only.
Spray Only
if You Have
1
or More Weeds
Per Square Metre
Mixed Population of
Grassy Weeds.
Spray Only if You Have
1
or More Weeds
Per Square Metre

Table 6. Yield Losses (Percent) in Canola Caused by Green Foxtail (Wild Millet)


Is the Green Foxtail Density Less Than 100 Plants Per Square Metre?
No
Yes
Has the Majority of the Green Foxtail Emerged Within One Week of the Crop?
No
Yield Loss Insignificant
Yes
Are Daytime Temperatures Near the Time of Spraying 20°C or Higher?
No
Yield Loss Insignificant
Yes

Green Foxtail Density (no. per square metre)	50	75	100	125	150	175	200	250	300	350	400	450	500
Yield Loss (percent)	3	4	5	6	8	9	10	13	15	18	20	23	25

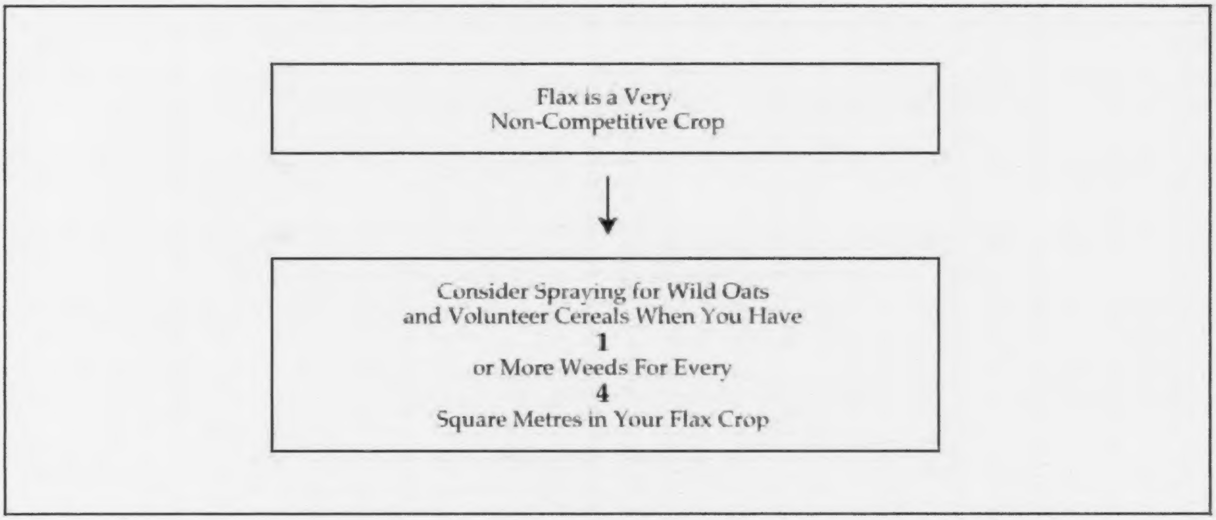
Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Table 7. Yield Losses (Percent) in Flax Caused by Wild Oats and Volunteer Cereals.

	Weed Density – Number Per Square Metre									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Wild Oat	6	8	10	12	13	15	16	17	18	19
Volunteer Wheat	6	11	15	18	22	24	27	29	31	33
Volunteer Barley	6	12	16	21	24	28	31	34	36	39

Sources: Dew and Keys, Agriculture Canada (Lacombe, Alberta)
Friesen et al., University of Manitoba (Winnipeg, Manitoba)

Figure 3. Spray Decision Guideline for Wild Oats and Volunteer Cereals in Flax.


Flax is a Very
Non-Competitive Crop
Consider Spraying for Wild Oats
and Volunteer Cereals When You Have
1
or More Weeds For Every
4
Square Metres in Your Flax Crop

Deciding to Spray – Economic Thresholds and Herbicide Resistance

An **economic threshold** is the level of infestation at which lost yield exceeds the cost of the chemical and its application. Determining the economic threshold will help you decide if a spray operation is necessary.

The following example outlines how to determine an economic threshold:

You have a wild oat problem in your wheat. After a thorough field scouting you have determined that your field has an average density of 35 wild oats per square metre. You know that the crop and weeds are at the same leaf stage. Using Table 1, choose the "Same Leaf Stage" row and read across to **35** wild oats per square metre. You will find that your yield loss will be about **18** percent.

You think it could be a 40 bushel per acre wheat crop, and expect to get $4 per bushel for it. Therefore:

40 bushels x 0.18 (percent of expected yield loss) =
7.2 bushels per acre of lost yield

7.2 bushels x $4 per bushel =
$28.80 per acre of lost income

Now find out the price of your herbicide. Most wild oat herbicides for wheat cost between $20 to $25 per acre. In this case, lost income exceeds the cost of the herbicide and application, so spraying would be justified.

Alternatively, you may want to use the figures provided with some of the yield loss tables. These figures provide flowcharts to assist you in making spray decisions. In some cases the flowcharts may indicate to spray when you do not have an economic threshold weed density, but most times they will prevent you from spraying unnecessarily.

Another factor to consider when deciding whether to spray is your herbicide rotation. A one in three rotation of herbicide groups is currently recommended to delay the development of herbicide resistance for weeds such as wild oats and green foxtail. Skipping a spray operation will give you an extra year of flexibility in your herbicide rotation. This means that you have one extra herbicide group to choose from the year after you skipped the spray operation. When making spray decisions, the ability to rotate herbicides should be considered in addition to the economics of spraying.

Making the Spray Decision

Remember that economic thresholds should be used only as guides when making a spray decision. Lost income caused by dockage or downgrading must also be considered. **FIELDS THAT ARE NOT SPRAYED THIS YEAR HAVE A HIGHER POTENTIAL FOR PROBLEMS THE FOLLOWING YEAR BECAUSE OF WEED SEED RETURN.** A farmer's experience and common sense play an important role when deciding to spray. Used properly, however, the economic threshold can be an important tool in making spray decisions.

Weed Resistance to Herbicides

In recent years, the number of herbicide-resistant weeds and the areas they infest have increased.

Most herbicide-resistant weed infestations have developed following repeated use of the same herbicide (or herbicide group) for a number of years on the same field. Growers who have developed weed resistance on their farms will typically see a weed, which is normally controlled by a herbicide, escape uncontrolled after a number of years of use of the same product or product group. Individual plants may be resistant to 1.5 up to 10 or more times the normal field rate.

Herbicide Groups

To help you plan your herbicide program, the following table lists "herbicide groups." To slow down the process of developing weed resistance, use products from different groups from year to year on your fields.

Table 1: Herbicide Groups Based on Mode of Action

Group 1 (contain ACCase grasskillers) Achieve Liquid Gold*, Axial, Axial iPak*, Axial Xtreme*, Broadband*, clethodim, clodinafop, Equinox, fenoxaprop, FlaxMax DLX*, Harmony (SG*, K* and Max*), Odyssey DLX*, Poast Ultra, quizalofop, Signal (D & M)*, Titanium*, tralkoxydim, Traxos, Tundra
Group 2 (contain ALS/AHAS inhibitors) Absolute*, Accent, Adrenalin*, Altitude FX*, Ares, Assert FL*, Barricade*, Battalion*, Broadband*, Escort, Everest GBX*, Express Pro, Express SG, flucarbazone, Frontline XL*, Frontline 2,4-D*, Harmony (SG*, K* and Max*), imazethapyr, imazethabenz, metsulfuron, Muster, Odyssey, Odyssey DLX*, Option, Pinnacle, PrePare, PrePare + glyphosate*, PrePass XC*, Prism, Retain*, Simplicity, Solo, Spectrum*, Stellar*, Tandem*, Tensile*, tribenuron, thifensulfuron/tribenuron, thifensulfuron/tribenuron + MCPA*, Triton C*, Triton K*, Ultim, Varro, Velocity m3*, Viper ADV*
Group 3 (contain mitotic inhibitors) Bonanza, Edge, Fortress*, Rival, Treflan
Group 4 (contain growth regulator herbicides) 2,4-D, 2,4-DB, Absolute*, Achieve Liquid Gold*, Adrenalin*, Altitude FX/FX2*, Assert FL*, Axial Xtreme*, Barricade*, Battalion*, bromoxynil/2,4-D ester*, bromoxynil/MCPA ester*, Curtail M, dicamba, dicamba/mecoprop-P/MCPA, dichlorporp/2,4-D, Distinct*, DyVel, DyVel DSp, Eclipse III*, Everest GBX*, FlaxMax DLX*, fluroxypyr + 2,4-D, Frontline XL*, Frontline 2,4-D*, glyphosate/dicamba*, Grazon, Harmony K*, Harmony Max*, Lontrel, MCPA, MCPB/MCPA, mecoprop-P, Momentum, Optica Trio, OverDrive*, Prestige XC, Pulsar, Restore, Retain*, Signal (D & M)*, Spectrum*, Stellar*, Tandem*, Tensile*, Titanium*, thifensulfuron/tribenuron + MCPA*, Tordon 22K, Triton C*, Triton K*, Trophy 600

Group 5 (contain photosynthetic inhibitors – triazines) AAtrex, metribuzin, Primextra II Magnum*, simazine, Velpar
Group 6 (contain photosynthetic inhibitors – nitriles/benzothiadiazoles) Achieve Liquid Gold*, Axial iPak*, Basagran / Basagran Forte, bromoxynil, bromoxynil/2,4-D ester*, bromoxynil/MCPA ester*, Infinity*, Signal (D & M)*, Titanium*, Tundra*, Velocity m3*, Viper/Viper ADV*
Group 7 (contain photosynthetic inhibitors – ureas/amides) linuron
Group 8 (unknown mode of action) Avadex BW, Avenge, Eptam-8E, Fortress*
Group 9 (contain inhibitors of EPSP synthase) Glyphosate - several brands. Cleanstart*, Eclipse III*, glyphosate/dicamba*, PrePare + glyphosate*, PrePass XC*
Group 10 (contain inhibitors of glutamine synthetase) Liberty
Group 11 (inhibit carotenoid synthesis - triazoles) Amitrol 240
Group 14 (contain inhibitors of protoporphyrinogen oxidase/PPO/Protox) Aim, Authority, Blazer, CleanStart*, flumioxazin, Heat, Reflex
Group 15 (inhibit cell division - benzamides, chloroacetamides) Dual II Magnum, Frontier, Kerb, Primextra II Magnum*
Group 19 (inhibits auxin transport) Distinct*, OverDrive*
Group 22 (membrane rupture, photosynthetic inhibitors) Diquat, Gramoxone, Reward
Group 27 (HPPD inhibitors – isoxazole) Axial iPak*, Infinity*, Tundra*, Velocity m3*

*Products contain more than one active ingredient and appear in more than one group. In some instances, both active ingredients act to kill the same weed using different modes of action. In these instances, use of tank mixes may slow down the process of developing weed resistance.

New herbicides do not necessarily have a unique mode of action and may fall within the groups listed in the charts.

Herbicides that have the same mode of action may not control the same weed spectrum or have the same crop safety. For example, Assert and Ally have the same mode of action; however, Assert controls wild oats while Ally does not.

How Herbicides Work

After applying a herbicide, fields can be scouted to determine the effectiveness of the treatment. The symptoms of different herbicide groups, and the approximate time it takes to develop these symptoms, is listed in the table below. Weed patches that are not affected should be noted and checked, as they may be herbicide resistant. Note that symptoms may take longer to develop when conditions are not conducive to rapid plant growth.

The following table gives a brief description of symptoms that may be exhibited if plants are injured by a herbicide. The symptoms of each group are addressed for both foliar and soil exposures.

Table 2: The Mode of Action, Site of Uptake and Symptoms of Different Herbicide Groups.

Herbicide Group	Mode of Action	Site of Uptake	Weed symptoms/timing	
			Grass weeds	Broadleaf weeds
1	Systemic	Foliar	Reduced growth, yellowing of growing point in 1 to 3 weeks. Newest leaf of affected plant pulls out easily in 3 to 5 days.	Tolerant
2	Systemic	Foliar/Soil	Newest leaves yellowed in 3 to 10 days, dead in 1 to 3 weeks.	Discolored (red/yellow/purple) at the growing point and spreading to the whole plant in 1 to 3 weeks.
3	Systemic	Soil	Reduced emergence, poor root development of emerged plants. Roots often swollen/stunted and root tips darkened.	Reduced emergence, poor root development of emerged plants.
4	Systemic	Foliar	Tolerant to moderate rates. High rates cause symptoms similar to drought. Poor timing may cause kernal abortion.	Abnormal growth (twisted stems, cupped leaves) in 2 to 10 days.
5	Systemic	Soil	Wilted and yellowed oldest leaves, death in 7 to 10 days.	
	Contact	Foliar	Yellowed oldest leaves, death within days.	Bleached oldest leaves, death within days.
6	Contact	Foliar	Some leaf burn possible.	Yellowed leaves in 2 to 4 days, death in 1 to 2 weeks.
7	Systemic	Soil	Yellowed and stunted plants, death in 10 to 14 days.	
	Contact	Foliar	Interveinal yellowing of oldest leaves, death within days.	
8	Contact	Foliar	Yellowed leaves in 3 to 7 days, stunted plants.	Tolerant
	Systemic	Soil	Reduced emergence, emerged leaves dark green/blue.	
9	Systemic	Foliar	Wilted, yellowed leaves in 7 to 10 days. Newest growth is impacted first followed by the rest of the plant.	
10	Contact	Foliar	Wilted, bleached leaves in 3 to 5 days, death in 1 to 2 weeks.	
11	Systemic	Foliar	Plants wilted in 2 to 3 days, bleached and purpling leaves in 1 to 2 weeks.	Plants wilted in 2 to 3 days, bleached leaves in 1 to 2 weeks. Perennial plants die slowly.
14	Contact	Foliar	Some leaf burn at contact points or leaf edges.	Leaves yellowed and desiccated in 1 to 3 days. (Post applications)
	Systemic	Soil	Bleaching and yellowing, death prior to or shortly following emergence	
15	Systemic	Soil	Reduced emergence, emerged plants stunted.	
19	Systemic	Foliar	Twisting of older leaves, new leaves fail to expand, plant death in 2 to 4 weeks.	
22	Contact	Foliar	Leaves wilted within hours, desiccated in 1 to 3 days.	Leaves wilted in 1 to 3 days, desiccated and dead in 3 to 7 days.
27	Systemic	Foliar	Some bleaching and whitening of leaves.	Leaves bleached and whitened in 2 to 10 days and death in 7 to 10 days.

How to Identify Weed Resistance

It is important to avoid confusing herbicide failure caused by resistance with herbicide failure caused by various other factors (such as weather or application errors). When a herbicide fails to control weeds because of weather or application factors, that herbicide may work in the field the next season. But when herbicides fail because of the development of resistance, they will fail in subsequent years, regardless of weather or application procedures.

Herbicide resistance should be suspected under the following conditions:

- A weed species that the herbicide controlled in previous seasons now escapes the treatment, while other weeds that appear on the label continue to be controlled in the field.
- The escapes cannot be attributed to adverse weather or emergence after application (if a post-emergence product is in question).
- Irregular-shaped patches of a weed develop where the herbicide gives little or no control.
- Records of the past history of the field show repeated use of the same herbicide, or combinations of herbicides, that kill the weed in question in the same way.

Table 3: Herbicide-Resistant Weeds in Western Canada

WEED	HERBICIDE GROUP	LOCATIONS CONFIRMED
Canada Fleabane	Group 9	Occurs in several US states
Cleavers	Group 2	AB, SK
	Group 4	AB
	Multiple combinations of: Groups 2 & 4	AB
Chickweed	Group 2	AB, SK
Green Foxtail	Group 1	AB, MB, SK
	Group 2	Occurs in MB & Ontario
	Group 3	AB, MB, SK
	Multiple combinations of: Groups 1 & 3	MB, SK
Hemp-nettle	Group 2	MB
	Group 4	AB
	Multiple combinations of: Groups 2 & 4	AB
Kochia	Group 2	AB, MB, SK
	Group 4	Occurs in North Dakota and Montana
	Group 5	
	Group 9	Occurs in Kansas, North Dakota and Alberta. Suspected in SK and MB.
Lamb's-quarters	Group 2	Occurs in Ontario
	Group 5	Occurs in Ontario
Marshelder (False ragweed)	Group 2	Occurs in North Dakota
Mustard, Ball	Group 2	AB
Mustard, Wild	Group 2	AB, MB, SK
	Group 4	MB
	Group 5	MB
Persian Darnel	Group 1	SK
Redroot pigweed	Group 2	Occurs in MB, Ontario and North Dakota
	Group 5	Occurs in Ontario
Russian thistle	Group 2	Occurs in SK, North Dakota and Montana
Shepherd's-purse	Group 2	AB, SK
Spiny Annual Sow-thistle	Group 2	AB
Stinkweed	Group 2	AB
Wild buckwheat	Group 2	AB
Wild oat	Group 1	AB, MB, SK
	Group 2	AB, MB, SK
	Group 8	AB, MB, SK
	Multiple combinations of Groups: 1 & 2, 1 & 8, 2 & 8, 1, 2 & 8	AB, MB, SK

See Table 1 on page 38 for a complete list of products in each Herbicide Resistance Group.

If Weed Resistance Develops on Your Farm

It is important to identify weed resistance before it spreads across your farm. Plan on conducting a "patch watch" scouting program this summer to identify suspicious patches before they become difficult to manage. Resistant weed patches have been identified on fields where producers were unaware of their existence.

Your patch watch program should begin shortly after spraying and continue through July after the crop has headed out and most weeds are visible from a distance. If you find suspicious looking patches, contact your local agricultural office or crop protection company representative to assist you in confirming weed resistance. If resistance is suspected:

1. Map the location of the patches and mark them with stakes so you will remember their location.
2. Mow, cultivate or spot spray the patches. Resistant patches should not be allowed to produce seed.
3. Patchy areas should NOT be harvested with the rest of the field. Harvest these areas separately, and make sure to clean all harvesting equipment before leaving the area to prevent the spread of seeds across the field or to a neighbouring field.
4. Check patches each year to monitor their spread. Keeping your resistant weeds isolated to a manageable patch is easier than dealing with an entire field of resistant weeds.

Surfactants and Herbicide Registrations:

Registrations listed are strictly those listed on the adjuvant label. For adjuvants recommended for use with a specific product, see the product page.

SURFACTANT	% Active ingredient	TYPE	REGISTERED HERBICDES
Agral 90 (PCP#11809 or 24725), Agsurf (PCP#15881 or 27921)	90	Non-ionic	Accent, Adrenalin SC, Altitude FX, Battalion, Escort, flucarbazone, glyphosate, Gramoxone, Muster, Pinnacle, Prism, imazethpyr, metsulfuron, thifensulfuron/tribenuron, Reflex, Reglone, Reward, Triton K, Ultim
Citowett Plus (PCP#12766)	50	Non-ionic	Accent, AAtrex, Basagran (peas), Battalion, Escort, metsulfuron, Muster, Pinnacle, Prism, thifensulfuron/tribenuron, Triton K, Ultim
Companion (PCP#15882)	70	Non-ionic	Glyphosate, metsulfuron, Muster
Enhance (PCP#29270)	80	Non-ionic	Accent, Battalion, Escort, glyphosate, Gramoxone, Lontrel, Muster, Pinnacle, Prism, imazethapyr, metsulfuron, thifensulfuron/tribenuron, Reflex, Reglone, Reward, Ultim
Permax (PCP#22604)	76	Non-ionic	Glyphosate, metsulfuron, Muster, Reglone
Super Spreader (PCP#17402)	50	Non-ionic	Accent, AAtrex, Basagran, Escort, flucarbazone, metsulfuron, Muster, Pinnacle, Prism, Reflex, Ultim
LI700 (PCP#23026)	80	Non-ionic	flucarbazone, glyphosate

* Note – some products are specific about the concentration of active ingredient in the surfactant for product performance. Check with the herbicide page in this guide or the product label.

Oil-based Adjuvants and Herbicide Registrations:

TRADE NAME	COMPOSITION	REGISTERED HERBICIDES
XA oil Concentrate (PCP#11769)	83% paraffin based mineral oil 17% surfactant blend	AAtrex, Basagran, Yuma GL
Addit (PCP#29263),	37% Surfactant blend	Bison
Adigor Adjuvant	48.8% methylated rapeseed oil 28.2% ethoxylated alcohols	Axial 100EC*
Amigo (PCP#22644), X-Act (PCP#28225)	30% phosphate ester surfactant	clethodim†*
Assist (PCP#16937)	83% paraffin based mineral oil 17% surfactant blend	Basagran (all crops), Blazer, Simplicity,
Corn oil (PCP#18473)	99% paraffin based mineral oil 1% surfactant blend	AAtrex, linuron
Hasten (PCP#27420)	77.4% methyl and ethyl oleate (esterified vegetable oil)	Option 35DF
Merge (PCP#24702)	50% solvent 50% surfactant blend	Absolute, Ares, Equinox, FlaxMax DLX*, Odyssey, Odyssey DLX, Poast Ultra, quizalofop, Solo, Tensile, Triton C

Continued on next page

TRADE NAME	COMPOSITION	REGISTERED HERBICIDES
Foothills B (PCP#29280), Score (PCP#12200) , Signal (PCP#29173), Steppe (PCP#29281)	83% paraffin based mineral oil 17% surfactant blend	clodinafop†*, clodinafop + bromoxynil/ MCPA ester†*, Harmony K*, Harmony SG*
Sure-Mix (PCP#25467)	60% paraffin based mineral oil 35.6% surfactant blend	quizalofop
Turbocharge (PCP#23135)	50% mineral oil 39.5% surfactant blend	Achieve Liquid Gold*, Titanium, tralkoxydim†*,

* The adjuvant is packaged with the product.

† Note: All products may not be registered with all adjuvants. See product page in the following sections to determine which adjuvants are registered for each herbicide.

Adjuvants and Your Herbicide

Adjuvants are important ingredients in chemical weed control. Many herbicides must be applied with an adjuvant. If it is forgotten, the level of weed control can vary widely, and re-spraying may be necessary.

Most products have adjuvants built into the formulation (e.g. Puma^{120} Super). Other require adjuvant addition (e.g. Refine SG). Some adjuvants were developed specifically for one herbicide, and these are either pre-packaged with the herbicide, or are identified by name on the label (e.g. Turbocharge for Achieve, Amigo for Select).

With some products, adjuvants need to be added only under certain conditions. For example, glyphosate products have built-in adjuvants, but require additional adjuvant when low rates (pre-seeding or chem-fallow), high water volumes, or certain tank mixes are used.

Adjuvants should be added only when required. If one is not required, addition can reduce weed control or injure crops. Product labels will describe when an adjuvant is required, and what type should be used.

There are two main classes of adjuvants: "activators or spray modifiers" (these include surfactants and crop oils), and "utility modifiers" (these include pH adjusters, water conditioners, low-drift adjuvants, and anti-foaming agents). The most important class of adjuvants is the activators. Surfactants, the main group within the activators, are "*surface active agents*." These chemicals produce effects at points where two substances touch, such as between two liquids (herbicide and water) or between a solid and a liquid (herbicide and leaf surface). Some surfactants act as dispersing agents, helping to keep a pesticide suspended in water. Others work on the plant, improving the wetting, sticking and penetrating characteristics of the herbicide droplets. Oil-based adjuvants contain petroleum or vegetable oil plus an emulsifier that suspends the oil in tiny droplets within the spray solution. Oil-based adjuvants typically assist in herbicide penetration into the leaf.

There are two basic type of surfactants (ionic and non-ionic), of which the non-ionic are most common. The tables on the previous page list the surfactants registered for use with herbicides in Western Canada.

Crop and Herbicide Recommendation Tables

The ratings in the following charts give general comparisons based on rates, timing and other application instructions and precautions as outlined in this Guide.

The ratings for crop tolerance and weed control are explained below. Where ratings are not given, a dot (•) will indicate if the weed is listed on a product label. Where rate ranges are listed for controlling a given weed, ratings are based on results achieved with the higher rate.

RATING	CROP TOLERANCE	WEED CONTROL
E - Excellent	Consistently exhibits a high degree of tolerance over a wide range of growing conditions.	Consistently provides a high degree of control over a wide range of growing conditions.
G - Good	Exhibits good crop tolerance under most growing conditions.	Provides good control under most growing conditions.
F - Fair	Tolerance is acceptable depending on growing conditions.	Control is acceptable depending on growing conditions.
P - Poor		Provides suppression, but control is often unacceptable.

All ratings are primarily based on the use of the herbicides on their own. Tank mixing herbicides may reduce the control of one or both tank mix partners, or result in a reduced level of crop safety.

Weed Control Tables

Table 1. Weed Control in Barley

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Quackgrass	Volunteer Corn	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
2,4-D	65	G								P		G	P	E		G	E		E	•	G	E	F	P	E	P		E	P
Achieve Liquid Gold	75	G	F	G			G	E	F			G		G		G	E		E	G	G	G	G	P	G	P		G	G
Avadex	88	E					G																						
Avenge	92	G					G																						
Axial	93		•	•			•																						
Axial Xtreme	96		•	•			•	S			•					•			S										
Barricade II	98		E					•	•		•			•	•	•	•		•	•	•		•		•	•	•	•	
Bromoxynil	108	E						G				F				F	G		F	F	G		G		F				
Bromoxynil/2,4-D	112	E						E	F			G		E		G	E		E	G	G	G	G		G			G	G
Bromoxynil/MCPA	113	E						E	F			G		G		G	E		E	G	G	G	G	P	G	P		G	G
Curtail M	125	G						G				•	G^{5}	E		S	E		E	F		E	F	G	E	G		F	G
Dicamba + MCPA/2,4-D	126	F						G			G	G	P	E	F^{3}	G	E		E	G	G	E	G	F	E	F		G	F
Dicamba/mecoprop/MCPA	130	F						G	G		G			E	F	G	E		E	G	G	E	G	F	E	F		G	G
Dichlorprop/2,4-D	132	G						G	G^{5}			G		E		G	E	F	E	G	G	E	G	F	E	F		G	G
DyVel	139	F						G			S	G		E	F	G	E		E	G	G	E	G	F	E	F		F	F
DyVel DSp	141	F						G			S	G		E		G	E	S	E	G	G	E	G	F	E	F		G	F
Fenoxaprop	154	G	E	E			G																						
Fluroxypyr + 2,4-D	164	G						G		S	E	G	G^{6}	E	S	E	E	E	E	E	G	E	G	S	E	S	E	E	•
Fortress	167	G		G			G	P								P	P			P	P								
Frontline XL	172	E						E		E	E		F^{11}	•	G		E		E	E		E	E	F	E	F		E	•
Imazamethabenz	196	E					G	P											G						G				
Infinity	200							•		•	•		•^{9}	•	•	•	•	S	•	•	•	•	•	S	•	S		•	
Linuron + MCPA amine	207	F		P				G		G		G		E	F	G	E		E	G		E	F		E				
Lontrel 360	210	E						G																G		G			
MCPA	212	E										G	P	E	F	F	E		E	F	F	E	P	P	E	P			P
MCPA K	212	E										G		E	F		E		E			E		P	E	P			
Mecoprop-p	217	G								E	G						E		E							P			
Metribuzin	218	F							G	G					F		G		G	F	G		G		G			G	
Metsulfuron + 2,4-D	221	G								G				E	G	•	E		E	E	G	E	G	F	E	F		G	
Momentum	224							•			•					•										•	•		
Prestige XC	243	E						E		S	E		G^{6}	E	S	E	E	E	E	G		E	G	E	E	E	E	E	E
Spectrum	264	E						E		E	E		F^{11}	E^{6}	E		E		E	E		E	E	G	E	G		E	
Thifensulfuron/tribenuron	270	E						G		E	F			E	E	•	E	F	E	E	E	G	E	F	E	F		G^{5}	G
Thifensulfuron/tribenuron + MCPA	274							G		E	F		•^{12}	E	E	G	E	F	E	E	E	G	E	F	E	F		G	G
Titanium	275	G	F	G			G	E	F			G		E		G	E		E	G	G	G	G		G			G	G
Tralkoxydim	278	G	F	G			G																						
Trifluralin (foxtail control)	285	E		G																									
Trifluralin (grassy and broadleaf)	285	F	G	G			F	F		G							G			G									
Triton C	290	E						G		E	•			E	E	•	E	F	E	E	E	G	E	F	E	F		G^{5}	G
Triton K	292							•						•		•	•		•	•	•	•			•			•	•
Trophy	294	E						S			G	G		E	F	E	E		E	E		G	S		G		•	E	•
Tundra	295		•	•			•	•		•	•		•^{9}	•	•	•	•	S	•	•	•	•	•	S	•	S		•	

[2] 2,4-D mixes only. [3] MCPA K mixes only. [5] Will not control CLEARFIELD canola varieties. [6] Spring seedlings only.

[9] Up to 25 cm diameter. [11] Seedlings and overwintered rosettes. [12] Less than 15 cm diameter

• Control. S - Suppression

Table 2. Weed Control in Oats

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Quackgrass	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
Bromoxynil	108	E					G				F				F	G		F	F	G		G		F				
Bromoxynil/MCPA	113	E					E	F			G		G		G	E		E	G	G	G	G	P	G	P		G	G
Curtail M	125	G					G				•	G[4]	E		S	E		E	F		E	F	G	E	G		F	G
Dicamba + MCPA	126	F					G			G	G	P	E	F[2]	G	E		E	G	G	E	G	F	E	F		G	F
Dicamba/mecoprop/MCPA	130	F					G	G		G			E	F	G	E		E	G	G	E	G	F	E	F		G	G
DyVel	139	F					G			S	G		E	F	G	E		E	G	G	E	G	F	E	F		F	F
Frontline XL	172	E					E		E	E		F[8]	•	G		E		E	E		E	E	F	E	F		E	•
Linuron + MCPA amine	207	F		P			G		G		G		E	F		E		E	G		E	F		E				
Lontrel 360	210	G					F																F		G			
MCPA	212	E									G	P	E			E		E			E		P	E	P			P
MCPA K	212	E									G		E	F		E		E			E		P	E	P			
Mecoprop-p	217	G							E	G						E		E							P			
Spectrum	264	E					E		E	E		F[8]	E[4]	E		E		E	E		E	E	G	E	G		E	
Thifensulfuron/tribenuron	270	G					G		E	F			E	E	•	E	F	E	E	E	G	E	F	E	F		G[3]	G
Thifensulfuron/tribenuron + MCPA	274	E					G		E	F		•	E	E	G	E	F	E	E	E	G	E	F	E	F		G	G

[2] MCPA K mixes only. [3] Will not control CLEARFIELD canola varieties. [4] Spring seedlings only. [8] Seedlings and overwintered rosettes.

[9] Less than 15 cm diameter

S - Suppression. • Registered for control.

Table 3. Weed Control in Rye or Triticale

HERBICIDE	PAGE	Crop Tolerance	Crop Tolerance - Triticale	Barnyard Grass	Foxtail, Green and Yellow	Quackgrass	Volunteer Corn	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
2,4-D[3,4]	65	G									P		G	P	E		G	E		E	•	G	E	F	P	E	P		E	P
Achieve Liquid Gold[1,4]	75	G		F	G			G	E	F			G		G		G	E		E	G	G	G	G	P	G	P		G	G
Avenge[1]	92	G	G					G																						
Bromoxynil[1]	108	E	E						G				F				F	G		F	F	G		G		F				
Bromoxynil/MCPA[1,4]	113	E							E	F			G		G		G	E		E	G	G	G	G	P	G	P		G	G
Dicamba + 2,4-D[2,4]	126	F							G			G	G	P	E		G	E		E	G	G	E	G	F	E	F		G	F
Infinity[5]	200								•		•	•		•[6]	•	•	•	•	S	•	•	•	•	•	S	•	S		•	
MCPA[3,4]	212	E											G	P	E	F	F	E		E	F	F	E	P	P	E	P			P
Tralkoxydim[3]	278	G	G	F	G			G																						

[1] Fall rye only. [2] Spring rye only. [3] Fall and Spring rye. [4] Rye only; not registered for triticale. [5] Triticale only. [6] Up to 25 cm diameter.

• Registered for control. S - Suppression.

Table 4. Weed Control in Winter Wheat

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Quackgrass	Volunteer Corn	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
2,4-D	65	G								P		G	P	E		G	E		E	•	G	E	F	P	E	P		E	P
Achieve Liquid Gold	75	G	F	G			G	E	F			G		G		G	E		E	G	G	G	G	P	G	P		G	G
Avenge[3]	92	G					G																						
Bromoxynil	108	E						G				F				F	G		F	F	G		G		F				
Bromoxynil/MCPA	113	E						E	F			G		G		G	E		E	G	G	G	G	P	G	P		G	G
Dicamba + MCPA/2,4-D	126	F						G			G	G	P	E	F[1]	G	E		E	G	G	E	G	F	E	F		G	F
Dicamba/mecoprop/MCPA	130	G						G	G		G			E	F	G	E		E	G	G	E	G	F	E	F		G	G
Dichlorprop/2,4-D	132	G						G	G[6]			G	SL	E		G	E	F	E	G	G	E	G	F	E	F		G	G
DyVel	139	F						G			S	G		E	F	G	E		E	G	G	E	G	F	E	F		F	F
DyVel DSp	141	F						G			S	G		E		G	E	S	E	G	G	E	G	F	E	F		G	F
Fluroxypyr + 2,4-D[7]	164							•		S	•	•	•[8]	•		•	•		•			•	•		•	S		•	•
Infinity	200							•		•	•		•[4]	•	•	•	•	S	•	•	•	•	•	S	•	S		•	
MCPA	212	E										G	P	E	F	F	E		E	F	F	E	P	P	E	P			P
Metribuzin[3]	218	F												F								F			G				
Prestige XC	243							•		S	•		•[6]	•[6]	S	•	•	•	•	•		•	•	•	•	•	•	•	•
Tandem	267		•	•			•	•		•	•[2]		S	•	•	•[2]		•		•			•				•	•[2]	
Thifensulfuron/tribenuron	270	G						G		E	F			E	E	•	E	F	E	E	E	G	E	F	E	F		G[2]	G
Thifensulfuron/tribenuron + MCPA	274							G		E	F		•[5]	E	E	G	E	F	E	E	E	G	E	F	E	F		G[2]	G
Tralkoxydim	278	G	F	G			G																						
Varro	299		•	S			•	•			•				•		S	S	•	•	S	•			•			•[2]	

[1] MCPA K mixes only. [2] Will not control CLEARFIELD canola varieties and group 2 resistant biotypes. [3] Norstar only. [4] Up to 25 cm diameter. [5] Less than 15 cm diameter. [6] Spring seedlings only. [7] Attain XC and Octtain XL only. To be applied in spring. [8] Spring rossette only. • Registered for control S - Suppression. SL - Season long control.

Table 5. Weed Control in Spring Wheat

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Quackgrass	Volunteer Corn	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
2,4-D	65	G								P		G	P	E		G	E		E	•	G	E	F	P	E	P		E	P
Achieve Liquid Gold	75	G	F	G			G	E	F			G		G		G	E		E	G	G	G	G	P	G	P		G	G
Adrenaline SC[11]	76		•	•			•	•		S	S	•	S	•	S	•	•		•	•	•	•	•	S	•	S		•	
Altitude FX[11]	80		•	•			•	•		•	•	•		•	•	•	•		•	•		•	S		•		•	•	•
Avadex	88	G					G																						
Avenge[7,8]	92	G					G																						
Axial[7]	93			•			•																						
Axial Xtreme	96		•	•			•	S			•					•			S										
Barricade II	98	E						•	•		•			•	•	•	•		•	•	•		•		•	•	•	•	
Basagran + 2,4-D[7]	100	E										G					G		E	F	G	E	•		E			E	
Bromoxynil	108	E						G				F				F	G		F	F	G		G		F				
Bromoxynil/2,4-D	112	E						E	F			G		E		G	E		E	G	G	G	G		G			G	G
Bromoxynil/MCPA	113	E						E	F			G		G		G	E		E	G	G	G	G	P	G	P		G	G
Clodinafop	122	G	E	G			E																						
Clodinafop + Bromoxynil/MCPA	122	G	E	G			E	E	F			G		G		G	E		E	G	G	G	G	P	G	P		G	G
Curtail M	125	G						G				•	G[6]	E		S	E		E	F		E	F	G	E	G		F	G
Dicamba + MCPA/2,4-D	126	G						G			G	G	P	E	F[3]	G	E		E	G	G	E	G	F	E	F		G	F
Dicamba/mecoprop/MCPA	130	G						G	G		G			E	F	G	E		E	G	G	E	G	F	E	F		G	G
Dichlorprop/2,4-D	132	G						G	G[6]			G		E		G	E	F	E	G	G	E	G	F	E	F		G	G
DyVel	139	G						G			S	G		E	F	G	E		E	G	G	E	G	F	E	F		F	F
DyVel DSp	141	G						G			S	G		E		G	E	S	E	G	G	E	G	F	E	F		G	F
Fenoxaprop	154	G	E	E			G																						
Flucarbazone	159	F		E[1]			G												•	•		•	•					•[5]	
Fluroxypyr + 2,4-D	164	G						G		S	E	G	G[6]	E	S	E	E	E	E	E	G	E	G	S	E	S	E	E	•
Fortress	167	G		G			G	P								P	P			P	P								
Frontline + 2,4-D	170							•		•	•	•	•[2]	•	S	•	•		•	•	•	•	•	S	•	S		•	•
Frontline XL	172	E						E		E	E		F[2]	•	G		E		E	E		E	E	F	E	F		E	•
Harmony K	190	G	G	G			E	G		E	F			E	F	•	E	F	E	E	E	G	E	F	E	F		G[5]	G
Harmony SG	192	G	G	G			E	G		E	F			E	F	•	E	F	E	E	E	G	E	F	E	F		G[5]	G
Imazamethabenz	196	G					G	P											G						G				
Infinity	200							•		•	•		•[12]	•	•	•	•	S	•	•	•	•	•	S	•	S		•	
Linuron + MCPA amine	207	F		P				G		G		G		E	F		E		E	G		E	F		E				
Lontrel 360	210	E						G																F		G			
MCPA	212	E										G	P	E	F[3]		E		E			E		P	E	P			P
Mecoprop-p	217	G								E	G						E		E							P			
Metribuzin	218	F							G	G					F		G		G	F	G		G		G			G	
Metsulfuron + 2,4-D	221	G								G				E	G	•	E		E	E	G	E	G	F	E	F		G	
Momentum	224							•			•					•										•	•		
Prestige XC	243	E						E		S	E		G[6]	E	S	E	E	E	E	G		E	G	E	E	E	E	E	G
Simplicity	261			S[1]			•	S		•	•				•					•			•					•[5]	
Spectrum	264	E						E		E	E		F[2]	E[6]	E		E		E	E		E	E	G	E	G		E	
Thifensulfuron/tribenuron	270	E						G		E	F			E	E	•	E	F	E	E	E	G	E	F	E	F		G[5]	G
Thifensulfuron/tribenuron + MCPA	274	E						G		E	F		•[15]	E	E	E	E	F	E	E	E	G	E	F	E	F		G	G
Titanium	275	G	F	G			G	E	F			G		E		G	E		E	G	G	G	G		G			G	G
Tralkoxydim	278	G	F	G			G																						
Trifluralin (foxtail control)	285	E		G																									
Triton C	290	E						G		E	•			E	E	•	E	F	E	E	E	G	E	F	E	F		G[5]	G
Triton K	292							•						•		•	•		•		•	•			•			•	•
Trophy	294	E						S			G	G		E	F	E	E		E	E		G	S		G		•	E	•
Tundra	295		•	•			•	•		•	•		•[12]	•	•	•	•	S	•	•	•	•	•	S	•	S		•	
Varro	299		•	S			•	•			•				•		S	S	•	•	S	•			•			•[2]	

[1] Green foxtail only. [2] Spring seedlings and overwintered rosettes. [3] MCPA K mixes only. [5] Will not control CLEARFIELD canola varieties. [6] Spring seedlings only. [7] Not registered for durum wheat. [8] Not recommended for all spring wheat varieties. Check product listing for details. [10] Tank mix with 2,4-D ester when applying to durum wheat. [11] For use on CLEARFIELD wheat varieties only. [12] Up to 25 cm diameter. [13] Less than 15 cm diameter.

• Registered for control.   S - Suppression

Table 6. Weed Control in Corn

HERBICIDE	PAGE	Barnyard Grass	Volunteer Cereals	Foxtail, Green	Foxtail, Yellow	Wild Oats	Quackgrass	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Kochia	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed Annual Species, Lady's-thumb	Sow-thistle (Perennial)	Stinkweed	Sunflower, Volunteer	Thistle, Canada	Volunteer Canola
2,4-D	65									P		G	P	E	G	E	E	•	G	E	F	P	E	P	P	E
Accent	73	•		•	S	•	•																			
Atrazine	70					•		•								•	•	•			•					
Basagran/Basagran Forté	100									•	•	•				•	•	S	S	•	•		•		S	•
Battalion[5]	103	•		•	•		S	•								•	•	•			•					
Bromoxynil	108							G				F			F	G	F	F	G		G		F			
Bromoxynil/MCPA	113							•	•			•		•	•	•	•	•	•	•	•	S	•	•	S	•
Dicamba	126							•			•				•	•	•	•			•	S			S	
Dicamba + 2,4-D amine	126							•			•	•	S	•	•	•	•	•	•	•	•	S	•	•	S	•
Dual II Magnum	137	•		•	•													S								
DyVel DSp	141							G			S	G		E	G	E	E	G	G	E	G	F	E		F	G
Frontier Max	169			•																						
Glyphosate[1, 4]	174	E	E	E	E	E	F	G	G	E	E	•	F	E	E	E	E	E	E	E	E	F	E	E	F	•[7]
Impact + Atrazine	70	S		S	S					S						•	•	•			•					
Liberty 200 SN[3]	206	•		•	•	•	S	•		•		•				•	•	•		•	•	•	•		S	
MCPB/MCPA	215															•	•	•		•		S	•		S	•
Option 35 DF/Option 2.25 OD[6]	232	•		•	•					•						•	•	•								
Primextra II Magnum	245	•		•	•			•								•	•	•			•					
Ultim[2, 6]	297	•	•	•	•	•	•											•								

[1] For use on Roundup Ready varieties only. [2] See product page for registered corn varieties. [3] For use on Liberty 200 SN tolerant corn varieties only.

[4] Not all glyphosate products are registered for use on Roundup Ready Corn. [5] Registered for use in Red River Valley region of Manitoba ONLY. [6] For use in Manitoba only. [7] Except glyphosate tolerant varieties.

• Controlled S – Suppression

Table 7. Weed Control in Peas

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Quackgrass	Volunteer Barley	Volunteer Wheat	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's -purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada
Authority	86								•								•	•		•						
Avadex	88	E						G																		
Basagran/Basagran Forté	100	F									F	F	F					F	F	S	F	F	F		F	P
Clethodim	119	E	E	E	F	E	E	G																		
Edge Granular	144	G	E	E		S	S	S	G		G	S				S	G	E		G	S		S			
Equinox	147			•[1]	•	•	•	•																		
Imazethapyr	198	G		F[1]				F	S		G	G				G			E	G		G	G		E	
MCPA Sodium Salt/Amine	212	F													P			P	G			P			P	
MCPB/MCPA	215	F														F		G	G	G		G		P	G	P
Metribuzin	218	F									G					F		G	G				G		G	
Odyssey	228	G	G	E[1]		G	G[3]	G	S		E	E			E	S	S	S	E	E	E	E	G		E	
Odyssey DLX	229		•	•[1]		•	•	•	S		E	E			E	S	S	S	E	E	E	E	G		E	
Poast Ultra	236	E	E	E	F	E	E	G																		
Quizalofop	250	E	G	E	F	E	E	G																		
Trifluralin (broadleaf & grassy weeds)	285	G	G	G				F	F		G							G		G	G					
Viper	304		•	•		•	•	•	S			S					S	•	•	•		•	•		•	

[1] Green foxtail only. [3] Excluding CLEARFIELD varieties.

• Registered for control.

Table 8. Weed Control in Other Pulses

HERBICIDE	CROP							ANNUAL WEEDS																				PERENNIALS			
	PAGE	Bean, Dry	Fababean	Lentil	Chickpea	Soybean	Sweet White Lupin	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Volunteer Barley	Volunteer Wheat	Wild Oat	Buckwheat, Wild	Chickweed	Cleavers	Cocklebur	Hemp-nettle	Kochia	Lamb's-quarters	Mustard, Wild	Nightshade, Hairy	Pigweed, Redroot	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Canada Thistle	Dandelion	Perennial Sow-thistle	Quackgrass
Authority	86				X									•					•	•			•								
Basagran/Basagran Forté	100	X[6]	X			X									F	F	F			F	F	F	S	F	F	F	F	P			
Blazer	105					X											•			•	•		•			•		S			
Clethodim	119	X		X	X	X		E	E	E	E	E	G																		
Dual II Magnum	137	X[7]				X	X	G	G	G													P								
Edge Granular	144	X[1]	X	X[8]		X		E	E	E	S	S	S	G	G	S		S	G	E			G	S		S					
Eptam 8-E	145	X						G	G	G	F	F	G		G					G			G								
Equinox	147			X[10]					•		•	•	•																		•
Frontier Max	169	X[1]							•																						
Glyphosate[11, 12]	174					X[11]		E	E	E	E	E	E	G	E	E	•	E	E	E	E		E	E	E	E	E	F	F	F	F
Imazethapyr	198	X[3]				X																G									
Linuron	207					X	X	S	S	S				•	•								•		•	•	•				
Metribuzin (post-emergence)	218			X	X										F			F		F	F					F	F				
Metribuzin + Treflan (PPI)	218		X			X		G	G	G			F	F	G			F		G	G		G	G	G	G	G				
Odyssey	228			X[9]		X		G	G		G	G[15]	G	F[13]	E	E		F[13]	P[14]	S	E		E	E[13]	E	G	E				
Odyssey DLX	229			X[9]				•	•		•	•	•	S	E	E		S		S	E		E	E	E	G	E				
Pinnacle	235					X														•	•		•			•					
Poast Ultra	236	X	X	X	X	X	X	E	E	E	E	E	G																		F
Quizalofop	250	X[6]		X	X	X		G	E	•	E	E	G																		F
Reflex + Basagran	254	X[5]															•			•	•		S		•	•	•				
Solo	263			X[9]				•	•	•	•	•[15]	•	S		S			S[16]	•	•		•		•	•	•				
Trifluralin (broadleaf & grassy weeds)	285	X	X	X		X		G	G	G			F	F	G					G			G	G							

[1] White and kidney beans only. [2] Pre-emergent surface treatments only. [3] Pinto, pink and red beans only. (Refer to Imazethapyr section for full list of weeds controlled).
[5] For use on navy beans in the Red River Valley of Manitoba. Does not include weeds controlled by Basagran Forté. [6] Not all dry bean types have been tested for tolerance to this herbicide. [7] White, kidney and pinto beans only. [8] Fall applications only. [9] For use ONLY on CLEARFIELD lentil varieties. [10] Including Clearfield lentil varieties. [11] For use on glyphosate tolerant varieties only. [12] Not all glyphosate products are registered for use on glyphosate tolerant soybeans.
[13] Suppression in CLEARFIELD lentils. [14] Not controlled in CLEARFIELD lentils. [15] Not including CLEARFIELD wheat varieties.
[16] Will not control Group 2 resistant biotypes. Over 90% of kochia populations are resistant to Group 2 herbicides.
• Registered for control. S - Suppression.

Table 9. Weed Control in Flax and Solin (Low Linolenic Acid Varieties). Not all products are registered for use on Solin.

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Quackgrass	Volunteer Cereals	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada
Authority	86								•								•	•			•						
Avadex	88	E						G																			
Basagran[1]/Basagran Forté	100	F									F	F	F					F		F	P	F	F	F		F	F
Bromoxynil[1]	108	F							G				F				F	G		F	F	G		G		F	
Bromoxynil/MCPA[1]	113	F							E	F			G		G		G	E		E	S	G	G	F	P	G	P
Clethodim[1]	119	E	E	E	E	F	E	G																			
Curtail M[1]	125								F				•	G[2]	E			E		E	P		E	P	G	E	G
Eptam[3] 8-E	145	F	G	G	G		F	G			G							G			G						
Equinox[1]	147			•		•	•	•																			
FlaxMax DLX	158			•			•	•	F					G[2]	E			E		E	P		E	P	G	E	G
Fortress	167	G		G	G			G	P								P	P			P	P					
Lontrel 360[1]	210	E							G																F		G
MCPA/MCPA K	212	F											G	P	E	F		E		E			E		P	E	P
Poast Ultra[1]	236	E	E	E	E	F	E	G																			
Quizalofop[1]	250	E	G	E	•	F	E	G																			
Trifluralin (broadleaf and grassy weeds)[4]	285	F	G	G	G			F	F		G							G			G	G					

• Registered for control.
[1] Registered for use on Solin (low linolenic acid varieties). [2] Spring seedlings only. [3] Not recommended for use on flax in Saskatchewan. [4] Fall application only.

Table 10. Weed Control in Canola

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Quackgrass	Volunteer Barley	Volunteer Wheat	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada
Absolute[2]	72	G	G	E			G	G[6]	G	G		E	G			E	E	S	S		E	E	E	E	G	G	E	G
Ares[2]	83		•	•	•		•	•	•	•			•[8]				•		•		•[8]	•		•	•		•	
Avadex	88	E							G																			
Clethodim	119	E	E	E	E	F	E	E	G																			
Eclipse[4]	143	G		E		F	E	E	E	G	G	E	E		F		E	E	E		E	E	E	E	•	G[7]	E	G[7]
Edge Granular	144	G	E	E	E		S	S	S	G		G	S				S	G	E			E	S		S			
Equinox	147			•		•	•	•	•																			
Fortress	167	G		G	G				G	P								P	P			P	P					
Glyphosate[4,5]	174	E	E	E	E	F	E	E	E	F	G	E	E		F	E	E	E	E	G	E	E	E	E	E	F	E	F
Liberty[1]	203	G	G	G		F	F[3]	G[3]	G	G		G	G		F	G	G	G	G	G	G	G	G	G	G	G	G	F
Lontrel 360	210	G								G																G		G
Muster Toss-N-Go	226	G														G	G				G	P			G		F	
Odyssey[2]	228	G	G	E			G	G[6]	G	F		E	E			E	G	S	S		E	E	E	E	G		E	
Poast Ultra	236	E	E	E	E	F	E	E	G																			
Quizalofop	250	E	G	E	•	F	E	E	G																			
Solo[2]	263		•	•	•		•	•[6]	•	S			S					S[8]	•		•	•		•	•		•	
Tensile[2]	269		•	•	•		•	•	•	•			S						•		•	•		•	•	•[9]	•	•[9]
Trifluralin	285	E	G	G	G				F	F		G							G			G	G					

[1] For use **only** on Liberty Link varieties. [2] For use **only** on CLEARFIELD canola varieties. [3] Ratings based on 1.35 L/acre rate of Liberty. Control may be reduced at lower rates. [4] For use **only** on glyphosate tolerant canola varieties. [6] Will not control CLEARFIELD wheat volunteers. [7] Season long control. [8] May not control Group 2 resistant biotypes. Over 90% of kochia populations are resistant to Group 2 herbicides. [9] Top growth control only.
• Registered for control. S – Suppression.

Table 11. Weed Control in Potatoes*

HERBICIDE	PAGE	Barnyard Grass	Foxtail, Green and Yellow	Volunteer Canola	Volunteer Corn	Volunteer Barley	Volunteer Wheat	Wild Oats	Quackgrass	Chickweed	Dandelion	Hemp-nettle	Lamb's-quarters	Mustard, Wild	Nightshade	Pigweed, Redroot	Pigweed, Prostrate	Purslane	Smartweed (Annual)	Shepherd's-purse	Stinkweed
Chateau	162												•		•	•	•				
Clethodim	119	•	•		•	•	•	•													
Dual II Magnum	137	•	•												2	S					
Eptam 8-E	145	•	•			•	•	•	S	•			•		3	•	•	•			
Glyphosate (preplant use only)	174		•	•[1]	•[1]	•	•	•	•		•	•	•	•	•	•			•	•	•
Gramoxone (pre-emergent use only)	188	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•
Linuron (pre-emergent use only)	207	S	•							•			•			•	•	•	•	•	•
Metribuzin [4]	218			•						•		•	•	•		•			•	•	•
Poast Ultra	236	•	•		•	•	•	•	S												
Prism	246	•	•						•				S			•					
Reglone Desiccant	134																				

• Controlled S – Suppression

[1] Will not control glyphosate tolerant varieties. [2] American and Eastern black nightshades. [3] Hairy nightshade.

[4] Consult manufacturer or seed provider for varietal tolerance to Metribuzin.

***Note:** Before using any pesticides on potatoes, consult the list of Agricultural Pesticides Approved for Use, available from Simplot Canada and McCain Foods (Canada).

Table 12. Weed Control in Sunflowers

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Quackgrass	Volunteer Barley	Volunteer Wheat	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada
Authority	86									•								•	•			•				
Clethodim	119	E	E	E	F	E	E	G																		
Edge Granular	144	G	E	E		S	S	S	G		G	S				S	G	E			E	S	S			
Eptam 8E	145	G	G	G		F	F	G			G							G			G					
Imazamethabenz	196	F																		G					G	
Muster Toss-N-Go	226														G	G				G			G		F	
Poast Ultra	236	E	E	E	S	E	E	G																		
Solo[2,3]	263		•	•		•	•[1]	•	S			S					S[2]	•		•	•		•		•	
Trifluralin	285	E	G	G				F	F		G							G			G	G				

• Registered for control. S - Suppression.

[1] Will not control CLEARFIELD volunteers. [2] May not control Group 2 resistant biotypes. Over 90% of kochia populations are resistant to Group 2 herbicides.

3 Apply only on CLEARFIELD sunflower varieties.

Table 13. Weed Control in Special Crops

HERBICIDE	CROP								ANNUAL WEEDS																							PERENNIALS			
	PAGE	Canaryseed	Safflower	Caraway	Coriander	Buckwheat	Mustard	Oilseed mustard (*Brassica juncea*)	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Volunteer Barley	Volunteer Wheat	Wild Oat	Buckwheat, Wild	Catchfly, night-flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Volunteer Flax	Volunteer Mustard, Canola	Canada Thistle	Dandelion	Perennial Sow-thistle	Quackgrass
Avadex	88	✓[1]					✓							G																					
Avenge	92	✓												G																					
Bromoxynil	108	✓													G				F			F	G	F	F	G		G	F						
Bromoxynil/MCPA	113	✓													E	F			G	G		G	E	E	G	G	G	G	G		G	P		P	
Clethodim	119				✓		✓		E	E	E	E	E	G																					F
Curtail M	125	✓													F				•	E		S	E	E	P		E	P	E		F	G	G[4]	G	
Dicamba + MCPA	126	✓													G			G	G	E	F		E	E	G	G	E	G	E	P	G	F	P	F	
Dicamba/Mecoprop/MCPA	130	✓													G	G		G		E	F	G	E	E	G	G	E	G	E		G	F		F	
Edge Granular	144		✓	✓	✓		✓[2]		E	E	E	S	S	S	G		G	S			S	G	E		G	S		S							
Fortress	167						✓			G	G			G	P							P	P		P	P									
Linuron	207			✓	✓																		•												
Muster Toss-n-Go	226						✓[3]												G	G			G	P			G	F							
Odyssey	228							✓[6]	•	•		•	•†	•	•		•	•		•	•	S[7]	•	•	•	•	•	•	•		•†				
Odyssey DLX	229							✓[6]	•	•		•	•	•	•		•	•		•	•	S[7]	•	•	•	•	•	•	•		•†				•
Poast Ultra	236		✓	✓	✓	✓	✓		E	E	E	E	E	G																					F
Prestige XC	243	✓													E		S	E		E	S	E	E	E	G		E	G	E	E	E	E	G[4]	E	
Quizalofop	250						✓[5]	✓	G	E	•		E	G																					
Solo	263							✓[6]	•	•	•	•	•†	•	S			S				S[7]	•	•	•		•	•	•		•†				
Trifluralin	285		✓				✓		G	G	G			F	F		G						G		G	G									
Trophy	294	✓													S			•	•	•	•	•	•	•			•	S	•	•	•				

[1] Granular formulation only. [2] Yellow mustard only. [3] Brown and oriental mustards only. [4] Spring seedlings only. [5] Oriental mustard only. [6] For use in CLEARFILED varieties only. Non-CLEARFIELD varieties will be severely injured by this treatment. [7] May not control Group 2 resistant biotypes. Over 90% of kochia populations are resistant to Group 2 herbicides. † CLEARFIELD varieties not controlled

• Registered for control. S - Suppression.

Table 14a. Herbicides to Control Weeds Before Seeding or After Seeding but Prior to Crop Emergence

HERBICIDE	**Pre-seeding**	**Pre-emergent**	Barley	Canaryseed	Canola	Chickpea	Corn, Field	Corn, Sweet	Dry Beans	Field Pea	Flax	Forage Grasses	Lentil	Oats	Rye	Soybean	Wheat
Aim	✓		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
Amitrol	✓		✓		✓		✓		✓	✓						✓	✓
Authority Charge	✓	✓				✓				✓	✓						
CleanStart	✓		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
Glyphosate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Glyphosate + 2,4-D	✓	✓	✓												✓		✓
Glyphosate + Bromoxynil	✓	✓	✓											✓			✓
Glyphosate + Bromoxynil/MCPA	✓		✓	✓			✓	✓			✓	✓		✓	✓		✓
Glyphosate/dicamba	✓		✓				✓							✓	✓		✓
Glyphosate + Heat	✓	✓	✓	✓		✓	✓	✓		✓			✓	✓		✓	✓
Glyphosate + MCPA[1]	✓		✓			✓	✓	✓		✓	✓		✓	✓	✓		✓
Glyphosate + tribenuron	✓		✓											✓			✓
PrePass	✓		✓											✓			✓

[1] Rates of application varies among brands. Consult the product page for application rates.

Table 14b. Weed Control Before Seeding or After Seeding but Prior to Crop Emergence

HERBICIDE	PAGE	Brome, Downy	Buckwheat, Wild	Dandelion	Flixweed	Foxtail Barley	Foxtail, Green	Hemp-nettle	Kochia	Lady's-thumb	Lamb's-quarters	Mustard, Wild	Narrow-leaved Hawk's-beard	Pigweed, Redroot	Quackgrass	Russian Thistle	Shepherd's-purse	Stinkweed	Volunteer Cereals	Volunteer Canola (including glyphosate tolerant varieties)	Volunteer Flax	Wild Oats
Aim/Authority Charge	78		•						•		•	•		•				•		•		
Amitrol 240	82			•																		
CleanStart	117	•	•	•[2]	•		•	•	•	•	•	•	•	•		•	•	•	•	•	•	•
Glyphosate	174	•	•	S	•	S	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•
Glyphosate[1] + 2,4-D	174	•	•		•		•	•	•	•	•	•	•	•		•	•	•	•	•	•	•
Glyphosate + Bromoxynil	174		•				•		•	•	•	•				•		•	•	•		•
Glyphosate[1] + Bromoxynil/MCPA	174	•	•		•		•	•	•	•	•	•	•	•		•	•	•	•	•	•	•
Glyphosate/dicamba	186	•	•		•		•		•	•	•	•		•		•		•	•			•
Glyphosate + Heat	193	•	•	•	•	S	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•
Glyphosate + MCPA	202	•	•		•		•	•	•	•	•	•	•	•		•	•	•	•	•	•	•
Glyphosate + tribenuron	282		•	•	•	S	•	•	•		•	•	S	•		•	•	•	•	•		•
PrePass	241	•	•	S	•		•	•	S	•	•	•	•	•		•	•	•	•	•		•

• Controlled S – Suppression

[1] Rates of application varies among brands. Consult the product page for application rates.

[2] Spring seedlings only.

Table 14c. Herbicides for Use as Harvest Aid or Dessicant Before Crop Harvest

HERBICIDE†	Barley	Canola	Chickpea	Dry beans	Faba bean	Forage	Field Pea	Flax	Lentil	Oats	Potato	Soybean	Sunflower	Wheat
CleanStart	√			√			√			√	√	√		√
Glyphosate ††	√	√	√	√	√	√	√	√	√	√		√		√
Heat†††*				√			√		√			√	√	
Aim†††*	√			√			√			√	√	√		√
Reglone†††**		√	√	√		√	√	√	√	√	√	√	√	
Flumioxazin†††				√										

† Rates of application vary among brands. Consult glyphosate page for specific application rates . †† For pre-harvest perennial weed control and may provide harvest managment benefit. ††† For rapid plant tissue dry down to facilitate harvest. * May be tank mixed with glyphosate when used prior to harvest. ** Refer to product page for surfactant requirements.

Table 15. Weed Control in Summerfallow (Chem Fallow)

HERBICIDE	PAGE	Brome, Downy	Buckwheat, Wild	Dandelion	Flixweed	Foxtail Barley	Foxtail, Green	Kochia	Lady's-thumb	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Quackgrass	Russian Thistle	Stinkweed	Thistle, Canada	Sow-thistle (Perennial)	Volunteer Cereals	Volunteer Canola	Wild Oats
Dicamba + 2,4-D	126		•		•			•	•	•	•	•		•	•	S	S			
Dicamba/mecoprop/MCPA	130		•		•			•	•	•	•	•		•	•	S	S		•	
Distinct	136		•	•[4]				•	•	•		•				•[4]				
DyVel DSp	141		•		•			•	•	•	•	•		•	•	S			•	•
Glyphosate	174	•	•		•	S	•	•	•	•	•	•		•	•			•	•[2]	•
Glyphosate + 2,4-D amine (500 g/L)	174				•		•	•	•	S	•	•		S	•			•	•	•
Glyphosate + Bromoxynil	174		•				•	S	•		•	S			•			•	•	S
Glyphosate/dicamba	186	•	•		•	S	•	•	•	•	•	•		•	•			•	•[2]	•
Glyphosate + Heat	193	•	•	•	•	S	•	•	•	•	•	•		•	•			•	•	•
Lontrel 360	210		•													•	S			•
PrePass	241	•	•	S	•		•	S	•	•	•	•		•	•		S	•	•	•

• Controlled S – Suppression

[2] Not including glyphosate tolerant canola. [3] Rates of application varies among brands. Consult the product page for application rates.

[4] Top growth control only.

Table 16. Fall Weed Control in Stubble

HERBICIDE	PAGE	Flixweed	Narrow-leaved Hawk's-beard	Shepherd's-purse	Stinkweed	Thistle, Canada	Quackgrass	Dandelion
2,4-D	65	●		●	●	S		S
Amitrol 240	82					S		
Dicamba	126					S		S
Dicamba + Glyphosate	126	●		●	●	S	S	
Dicamba/ mecoprop/MCPA	130	●		●	●	S		
Distinct	136					●†		●†
DyVel DSp	141	●		●	●	S		
Glyphosate	174					S	●	●
MCPA	212	●		●	●	S		S
PrePass	241	●	●	●	●			●

• Control S – Suppression. Levels of suppression vary depending on the product and growing conditions in the fall. Regrowth and in-crop treatments can be expected.

† Top growth control only.

Table 17. Weed Control in Grass Pastures and Hayfields

HERBICIDE	RATE (per acre)	PAGE	Absinth	Bindweed, Field	Burdock	Thistle, Canada	Dandelion	Dock, Curled	Daisy, English	Flixweed	Foxtail Barley	Gumweed	Narrow-leaved Hawk's-beard	Knapweed	Leafy Spurge	Nodding Thistle	Poplar	Pussy Toes	Red Bartsia	Sage, Pasture	Snowberry	Sow-thistle, Perennial	Stinkweed	Tansy, Common	Wild Rose	Willow	Wormwood, Biennial
2,4-D (500 g/L)	0.57 - 1.82 L†	65	□	□	●	□	□	●		●		□	●		□	□	□	□	●	□	□	□	●				●
2,4-DB	0.71 - 1.72 L†	68		□		□	□	■					■									□	●				
Dicamba	0.85 - 1.86 L†	126		□		□	□	□	□					□	□					□	●	□		□			
Dicamba + 2,4-D	0.85 + 0.89 L†	126	□	□	●	□	□	□	□	●		□			□	□	□		●	□	●	□	●	□	●	□	
Escort	10 - 12 g	148				□	●										■					□		●	●	■	
Grazon	2.8 L	189			●	●	●	●																			
Kerb	0.36 - 0.45 kg	202									●																
MCPA (500 g/L)	0.7 - 1.9 L†	212		□		□	□	□		●		□			■							□	●	□			●
MCPB/MCPA	1.11 - 1.72 L	215		□		□																□	●				
Overdrive	115 g	234					□																				●
Reclaim	20 acre per case	252				●	●													●		●			●		
Restore	15 acre per case	255	●		●	●	●	●		●		●		●								●		●			
Tordon 22K	0.45 - 1.8 L	276		■††		●								●	■††					●							

• Controlled. ■ Controlled by the highest rate within this range. □ Top growth suppression. † Rates may vary between different brands. Check product page for specific rate for product and use. †† May require multiple applications for complete control.

Table 18. Weed Control in Shelterbelts

HERBICIDE	USE				SHELTERBELT SPECIES												WEEDS																				
	PAGE	Before Planting	After Planting (New & Established)	Established	American Elm	Birch	Caragana	Crabapple	Green Ash	Juniper	Lilac	Manitoba Maple	Poplar	Scots Pine	Siberian Elm	Willow	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Quackgrass	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Sow-thistle (Perennial)	Stinkweed	Thistle, Canada
Amitrol 240	82			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Casoron	116		●		●		●	●	●	●	●	●			●	●		●		●	●						●	●	●	●	●		●	●			
Glyphosate	174	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Gramoxone	188		●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●		●	●	●		●	
Linuron	207			●	●		●		●			●		●	●	●	●	●		●	●						●	●		●				●		●	
Simazine	259			●	●		●		●			●			●		●	●[1]	●	●								●						●			
Trifluralin Liquids	285	●		●	●		●		●					●	●		●	●	●	●	●							●		●		●					

• Controlled

[1] Yellow foxtail only.

Special Weed Problems

This section identifies specific weeds and some herbicides recommended for control. Refer to the particular crop section or the product label for information on specific products that may be used on the crops and for application instructions.

Absinthe

2,4-D LV Ester (500 g/L) - In grass pastures with no legumes, spray 1.82 L/acre in late June, prior to flowering. Re-treat regrowth in late summer when plants have 6 to 10 inches (15 to 25 cm) of new growth. More than 1 season of treatment may be required.

dicamba - In grass pasture and rangeland only, apply 0.5 L/acre in 20 to 30 gallons (90 to 135 L) per acre for top-growth control when leaves are fully expanded.

Restore – In grass pastures and rangeland, apply *Restore A* at 0.2 L and *Restore B* at 1 L per acre (one package treats 15 acres) when actively growing.

Alders

2,4-D LV Ester (500 g/L) - In grass pastures and non-crop land, apply 1.78 L/acre to the foliage of actively growing brush.

dicamba + 2,4-D amine or LV ester (500 g/L) -In grass pastures, rangeland and non-crop land, apply dicamba at 2.1 L per 1,000 L of water with 2,4-D LV ester or amine at 4.0 L per 1,000 L of water to the foliage of actively growing brush in the spring or early summer and wet the foliage until the point of runoff.

Aspen Poplar (Trembling Aspen)

dicamba + 2,4-D amine or LV ester (500 g/L) - In grass pastures, rangeland and non-crop land, apply dicamba at 1.32 L/acre with 2,4-D LV ester or amine at 1.78 L/acre in 20 gallons/acre (90 L/acre) water to the foliage of actively growing brush in spring or early summer.

Baby's Breath (Perennial)

dicamba - In grass pastures with no legumes, apply 3.72 L/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water when actively growing.

Biennial Wormwood

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing plants.

Overdrive - In grass pastures and non-crop land, apply Overdrive at 115 g per acre for control.

Black Medic

Bromoxynil/MCPA ester; Dichlorprop/2,4-D; Mecoprop-p; dicamba/mecoprop/MCPA; 2,4-D amine or LV ester - Apply in registered crops at registered rates to black medic in the 1 to 4 leaf stage for suppression only.

Chokecherry

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing brush.

Common Tansy

Glyphosate - Apply at 1.9-2.8 L/acre in 10 gallons of water/acre (40 L/acre) to actively growing plants that are 8-10 inches (20-25 cm) tall (summerfallow, stubble and noncropland).

Escort - In pastures, rangeland and rough turf, apply 8 g/acre in 10 to 20 gallons/acre (45 to 90 L/ acre) of water to actively growing plants of less than 4 inches (10 cm) tall. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

Restore – In grass pastures and rangeland, apply *Restore A* at 0.2 L and *Restore B* at 1 L per acre (one package treats 15 acres) when actively growing.

Curled Dock

dicamba - As a patch treatment or in pasture and rangeland, apply 0.92 L/acre Banvel II in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds for top growth control.

Glyphosate - As a spot treatment, apply 2.83 to 4.86 L/acre (360 g/L formulations or equivalent of other formulations) in 10 gallons/acre (45 L/acre) water when most plants have reached the early bud stage. Do not disturb treated plants for at least 10 days following treatment.

MCPA amine, 2,4-D amine - Apply 0.445 to 0.69 L/acre of formulations containing 500 g/L MCPA or 2,4-D amine to give top growth control.

Dichlorprop/2,4-D - 0.71 L/acre for suppression before plants are 2 inches (5 cm) tall.

Diffuse and Spotted Knapweed

dicamba - In grass pastures, rangeland and non-crop land, apply at 1.86 L/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds.

Restore – In grass pastures and rangeland, apply *Restore A* at 0.2 L and *Restore B* at 1 L per acre (one package treats 15 acres) when actively growing.

Tordon 22K - In rangeland and grass pasture, apply 0.91 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

Downy Brome and Japanese Brome

Adrenalin, Altitude FX - Apply at label rates to suppress Japanese brome to the 4 leaf stage in CLEARFIELD wheat.

Glyphosate - Prior to crop emergence, apply 0.51 to 0.77 L/acre (360 g/L formulations or equivalent of other formulations) in 5 to 10 gallons/acre (23 to 45 L/acre) water before downy brome is 6 inches (15 cm) in height.

glyphosate /dicamba - Prior to crop emergence, apply 1.0 L/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water between emergence and heading of downy brome.

Odyssey DLX - control spring seedlings of Japanese brome in registered crops.

PrePass - Apply in spring or fall, prior to seeding cereal crops or in fallow at registered rates to control downy brome up tot he 4 leaf stage.

Simplicity - Suppression of downy brome and control of Japanese brome up to the 6 leaf stage when applied at 0.2 L per acre in the fall in winter wheat. Apply in spring at 0.2 L per acre to control Japanese brome up to the 6 leaf stage in winter or spring wheat (including durum).

Solo - Apply at label rates to suppress Japanese brome to the 4 leaf stage in registered crops.

Tandem - Applied at the maximum labelled rate in spring wheat (including durum) will control Japanese brome up to the 6 leaf stage.

Trifluralin - Apply at recommended rates for weed control in broadleaf crops prior to emergence.

Velocity m3/All-in-One - Apply at registered rates in registered crops to suppress Japanese brome.

Viper - In field peas, at registered rates to suppress Japanese brome.

Field Bindweed

dicamba - As a patch treatment or in rangeland, apply 1.0 L/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water. Apply when field bindweed is in the flowering stage and allow 3 weeks after treatment before resuming normal summerfallow tillage.

Basagran - In labelled crops, apply 0.71 L/acre followed by 0.71 L/acre 7 to 10 days later. Apply in 20 to 35 gallons/acre (90 to 160 L/acre) water before field bindweed has developed a dark green colour and before it has begun trailing. Use a recommended surfactant (see recommendations under the appropriate crop).

2,4-DB - As a spot treatment in labelled crops apply 2.83 to 4.86 L/acre in 10 gallons/acre (45 L/acre) water at the bud stage. Do not disturb plants for at least 10 days following treatment. Heavy rainfall within 2 hours of application may wash chemical off the foliage and a repeat treatment may be required. Rainfall occurring within 6 hours after application may reduce control.

2,4-D amine - In grass pastures containing no legumes or as a spot treatment, apply 1.82 L/acre of formulations containing 500 g/L 2,4-D amine at early flowering stage.

Glyphosate - As a spot treatment, apply 2.8 to 4.9 L/acre (360 g/L formulations or equivalent of other formulations) in 10 to 30 gallons/acre (45 to 135 L/acre) at the full bloom stage or beyond. Allow 7 or more days after application before tillage.

glyphosate/dicamba - Prior to crop emergence, apply 1.26 L/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water to foxtail barley before initiation of the seed head for suppression only.

Tordon 22K - In rangeland and grass pasture, apply 3.6 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

Field Horsetail

Amitrol 240 - Apply 5.0 to 6.7 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in non-cropped areas and pastures when the weed is young and actively growing.

MCPA amine, potassium and sodium salt mixtures - Apply 0.57 L/acre of formulations containing 500 g/L MCPA after the weeds have fully emerged for top growth control. May be used in wheat, oats, barley, flax and rye.

Foxtail Barley

Glyphosate - Prior to crop emergence, apply 1 to 2 L/acre (360 g/L formulations or equivalent of other formulations) in 5 to 10 gallons/acre (23 to 45 L/acre) water to foxtail barley at the seedling to heading stage. Late fall applications may provide better control of established plants than spring applications.

Glyphosate - In glyphosate tolerant canola, apply 2 applications, each at 0.5 L/acre (360 g/L formulations or equivalent of other formulations), for season long control.

Gramoxone - Apply 2.23 L/acre in 98 gallons/acre (445 L/acre) water or 75 mL in 2.2 gallons (10 L) water/1076 square feet (100 sq. m) for top growth control only.

Kerb 50-W - Apply 0.364 to 0.445 kg/acre product in 20 gallons/acre (90 L/acre) water between October 1 and freeze-up. Use the lower rate on grey-wooded soils or where perennial bluegrass or fescues are the predominant pasture species. Do not use Kerb for foxtail barley removal in seed grass stands or desired foliage stands of timothy or fescue grass species. At recommended rates, pasture stands of perennial bluegrass and fescue may be reduced by 10 to 15 percent. Where perennial bluegrass and fescues are the dominant pasture species, use the lower rate of Kerb. Spray overlaps may seriously harm desirable pasture grass species. Where the grass stand comprises mostly foxtail barley and reseeding to a desirable grass species is required, delay seeding into the Kerb-treated soil until the end of June. Do not harvest or graze within 60 days of application with Kerb. Avoid using Kerb on soils having more than 6 percent organic matter.

Goat's-Beard

2,4-D amine - Apply 0.91 L/acre of formulations containing 500 g/L in early fall or early spring.

dicamba - In grass pasture and rangeland only, apply 1.86 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Dichlorprop + 2,4-D - Apply 1.62 L/acre in early spring or fall.

Gumweed

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 0.89 L/acre to the foliage of actively growing plants.

Hemp Dogbane

2,4-D amine or LV ester - Apply 1.38 to 1.82 L/acre of formulations containing 500 g/L 2,4-D in fall before frost and while plant leaves are green.

Glyphosate - Apply 2.83 to 4.86 L/acre (360 formulations – see glyphosate page for other rates) when hemp dogbane is in the early bud stage. Apply in 10 gallons/acre (45 L/acre) water. Do not disturb treated plants for at least 7 days after application.

Hoary Cress

Amitrol 240 - For non-selective patch treatment in pastures and non-crop land, apply 8.9 to 13.8 L/acre.

Glyphosate - As a spot treatment in labelled crops, apply 2.83 to 4.86 L/acre (360 g/L formulations or equivalent of other formulations) in 10 to 30 gallons/acre (45 to 135 L/acre) water when most plants have reached the early bud stage. Do not disturb treated plants for at least 10 days following treatment.

Leafy Spurge

Amitrol 240 - Apply 15.2 to 18.5 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in non-cropped areas and pastures when the weed is between the late stages of flowering and early seed development.

dicamba - Apply 0.84 L/acre in 10 to 20 gallons/ acre (45 to 90 L/acre) water for top growth control when the weed is actively growing. Patch treatment or pasture.

2,4-D amine - Apply 1.82 L/acre of formulations containing 500 g/L 2,4-D at early flowering stage. Repeat at least once to new growth later in the season. Control of established plants and new seedlings will require continued applications for a period of at least 4 to 5 years.

Tordon 22K - In rangeland and grass pasture, apply 3.6 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

Overdrive - In grass pastures and non-crop land, apply Overdrive at 115 g per acre for top-growth control.

Locoweeds, Lupines, and Milk-vetches

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 to 2.75 L/acre at the full bloom stage.

Milkweed

Amitrol 240 - Apply 7.6 to 11.3 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in non-cropped areas and pastures in the early summer when all the shoots have emerged.

Glyphosate - When making Preharvest applications, use 1.0 L/acre (360 g/L formulations or equivalent of other formulations). For patch treatments, apply 4.86 L/acre (360 g/L formulations or equivalent of other formulations) in 10 gallons/acre (45 L/acre) water. Apply when most plants have reached the bud to bloom stage. Reduced results may occur on plants treated after full bloom as not all milkweed plants reach the required stage of growth at the same time. Repeat treatments may be required. Do not disturb plants for 10 days following treatment. Do not apply to plants covered with dust.

Narrow-leaf Hawk's-beard

2,4-DB - Apply to forage legume crops at recommended rates at the 2 to 4 leaf stage of narrow-leaf hawk's-beard, after legume growth in the fall has stopped.

2,4-D LV ester (600 g/L) - In fall stubble, apply 0.57 to 0.90 L/acre to fall rosettes. Apply to fall seedlings or spring seedling to the 2 leaf stage at 0.22 to 0.38 L/acre or 0.4 to 0.6 L/acre in spring prior to bolting to control.

Adrenalin SC - Up to the 4 leaf stage in registered crops.

Barricade, thifensulfuron/tribenuron, Triton C, Triton K - Up to 4 inches tall in registered crops.

Express Pro - Up to 3 inches tall with residual activity, prior to the seeding of registered crops.

Express SG - For season long control in range and pasture at the early bud – pre-bloom stage.

Frontline 2,4-D - Up to 2 leaf stage in registered crops.

Glyphosate - Prior to crop emergence, apply 0.51 to 0.77 L/acre (360 g/L formulations or equivalent of other formulations) in 5 to 10 gallons/acre (23 to 45 L/acre) water. Use the high rate if narrow-leaf hawk's-beard is between 3 and 6 inches (8 to 15 cm) in height.

Glyphosate - In glyphosate tolerant crops, apply 0.5 L/acre (360 g/L formulations or equivalent of other formulations) at the 0 to 6 leaf stage. Not all products are registered. Check glyphosate pages.

Heat - Apply in a mix with glyphosate for rapid burndown prior to seeding.

PrePass - up to 8 cm tall prior to seeding registered crops.

Tribenuron - Up to in a mix with glyphosate prior to seeding.

Velpar - Apply in late fall or early spring for control in established alfalfa in forage and seed production.

Pasture Sage

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.2 L/acre to the foliage of actively growing plants.

dicamba - In grass pastures, rangeland and non-crop land, apply dicamba at 1.86 L/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds.

Reclaim - In grass pastures and non-crop land, apply Reclaim A at 92 g per acre plus Reclaim B at 0.8 L per acre (20 acres per case) for 2 years of control.

Restore – In grass pastures and rangeland, apply *Restore A* at 0.2 L and *Restore B* at 1 L per acre (one package treats 15 acres) when actively growing.

Tordon 22K - In rangeland and grass pasture, apply 1.82 L/

acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

Perennial Smartweed

Glyphosate - Apply 2.0 L/acre (360 g/L formulations or equivalent of other formulations) in 10 gallons/acre water. Apply when vines are a minimum of 8 inches (20 cm) tall, but before flowering.

Poplar

dicamba + 2,4-D - In grass pasture and rangeland only, apply dicamba at 2.1 L plus 2,4-D 500 amine at 4 L or 2,4D 600 ester at 3.3 L per 220 gallons (1000 L) of water and apply by wand to the point of runoff when leaves are fully expanded.

Glyphosate - As a non-selective spot treatment, apply 1.21 to 2.43 L/acre (360 g/L formulations or equivalent of other formulations) in 10 to 30 gallons/acre (45 to 135 L/acre) water in the summer through early fall when brush is actively growing.

Poverty Weed

dicamba - As a spot treatment or in grass pasture or rangeland apply 1.86 L/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water when weed is actively growing. Dicamba at 0.61 L/acre will provide only top growth control.

Tordon 22K - In rangeland and grass pasture, apply 1.82 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

Prairie Everlasting, Prairie Sage

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing plants in the early fall, and repeat in the spring.

Purple Loosestrife

(dryland situations only)

Glyphosate - Apply 2.43 L/acre (360 g/L formulations or equivalent of other formulations) in 30 to 60 gallons/ acre (135 to 270 L/acre) water when purple loosestrife is actively growing and at or beyond the bloom stage. If using hand held equipment, apply a 1 to 2 percent solution until plants are wet. Use a 33 percent product solution if using a wiper applicator. Do not treat plants over open water. If possible, remove and destroy the flower heads before treatment to ensure prevention of seed set. For large monocultures of purple loosestrife, gradually work from the periphery inward over a number of years to allow competing vegetation to invade the treated area. Sprayed areas should be monitored for new seedlings to prevent re-infestation of purple loosestrife.

Red Bartsia

2,4-D amine or LV ester - Apply 0.57 L/acre of formulations containing 500 g/L 2,4-D in 10 gallons/acre (45 L/acre) water. On hayland, treat within 10 days after first cutting. Roadsides and pastures should be sprayed as soon as the red bartsia appears, usually in early July. Repeat treatment if necessary for later germination.

Roses

dicamba + 2,4-D amine or LV ester (500 g/L) - IIn grass pastures, rangeland and non-crop land, apply dicamba at 1.48 L/acre with 2,4-D LV ester or amine at 1.78 L/acre to the foliage of actively growing brush in the spring or early summer.

Escort - In pasture and rangeland, apply Escort at 0.012 kg/acre with non - ionic surfactant at 0.2 L per 100 L spray solution in 10 to 20 gallons/acre (45 to 90 L/acre) water. Apply between mid-June and mid-August after the brush has leafed out, but before the leaves begin to turn their fall colours.

Reclaim - In grass pastures and non-crop land, apply Reclaim A at 92 g per acre plus Reclaim B at 0.8 L per acre (20 acres per case) for 2 years of control.

Russian Knapweed

Tordon 22K - In rangeland and grass pasture, apply 1.82 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

dicamba - In grass pasture and rangeland only, apply 3.72 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Restore – In grass pastures and rangeland, apply *Restore A* at 0.2 L and *Restore B* at 1 L per acre (one package treats 15 acres) when actively growing.

Saskatoon

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing brush.

Scentless Chamomile

Bromoxynil/MCPA ester - Apply in registered crops at label rates when scentless chamomile is in the 2 to 4 leaf stage.

Curtail M - In registered crops, apply 0.81 L/acre in 10 gallons/acre (45 L/acre) water when scentless chamomile is actively growing and in the 2 to 4 leaf stage.

dicamba - Apply 0.51 L/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds for top growth control.

Escort - In pastures, rangeland and rough turf, apply 8 g/acre in 10 to 20 gallons/acre (45 to 90 L / acre) of water to actively growing plants of less than 4 inches (10 cm) tall. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

Express SG - Apply in a mix with glyphosate prior to seeding registered follow crops.

Liberty - In registered crops, apply 1.1 L/acre to plants up to 4 inches (10 cm) in height.

Lontrel - In registered crops, apply 0.23 L/acre in 10 gallons/acre (45 L/acre) water when scentless chamomile is actively growing and in the 2 to 4 leaf stage.

metsulfuron plus 2,4-D - Apply 3 g/acre metsulfuron plus 0.34 to 0.45 L/acre 2,4-D LV ester or amine (500 g/L formulations) in 10 gallons/acre (45 L/acre) water for control of scentless chamomile up to the 4 leaf stage in wheat, barley, and creeping red fescue. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

Restore – In grass pastures and rangeland, apply Restore A at 0.2 L and Restore B at 1 L per acre (one package treats 15 acres) when actively growing.

Thifensulfuron/tribenuron - Apply 8 g/acre of DG formulations or 12 g/acre of Refine SG in 10 gallons/acre (45 L/acre) water to actively growing seedlings for suppression. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

Tordon 22K - In rangeland and grass pasture, apply 0.445 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

Triton C - Apply at label rates to suppress scentless chamomile up to 10 cm across or high.

Stinging Nettle

2,4-D amine - Apply 0.91 to 1.82 L/acre of formulations containing 500 g/L 2,4-D amine.

Stork's Bill

Altitude FX, Everest GBX, Frontline XL, Prestige XC, Pulsar, Stellar, Tandem, thifensulfuron/tribenuron, Trophy 600 - Apply at label rates to provide suppression in registered crops. See product pages for Crops, Rates and Staging.

Basagran – In registered crops apply 0.91 L/acre at the 2 to 6 leaf stage.

Dichlorprop/2,4-D - Apply at 0.71 L/acre to registered crops when stork's-bill is in the 2 to 4 leaf stage.

Fluroxypyr + 2,4-D, OcTTain - Apply at the maximum labelled rate to registered crops when stork's-bill is in the 1 to 8 leaf stage.

Liberty - in registered crops apply 1.35 L/acre to plants in 1 to 3 leaf stage.

Linuron - Apply with MCPA amine in registered crops at registered rates to stork's-bill in the 2 to 4 leaf stage.

Metsulfuron - Apply with 2,4-D or MCPA amine or LV ester in registered crops at registered rates to stork's-bill in the 2 to 4 leaf stage.

Odyssey/Absolute – in registered crops, apply 17 g/acre of the Odyssey component plus adjuvant.

Glyphosate - in glyphosate tolerant crops, apply 0.5 L/acre (360 g/L formulations or equivalent of other formulations) from emergence to the 6 leaf stage.

Spectrum – In registered crops apply at 20 acres per case to control from the 2 to 4 leaf stage.

Toadflax (Yellow)

Amitrol 240 - Apply 7.6 to 11.3 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in non-cropped areas and pastures when the weed is in the advanced rosette to prebud stage.

Dichlorprop/2,4-D - Apply 0.71 L/acre in 10 to 18 gallons/acre (45 to 80 L/acre) water in wheat or barley for toadflax suppression. Apply when majority of toadflax is no taller than 6 inches (15 cm). The use of Dichlorprop/2,4-D for suppression of toadflax in wheat or barley should be part of a long-term planned approach for toadflax control, which includes spring and fall tillage, fall patch spraying, summerfallow or chemical fallow.

Glyphosate - Apply 2.83 to 4.86 L/acre (360 g/L formulations or equivalent of other formulations) when most plants have reached the early bud stage of growth. Allow 7 more days after application before tillage. A rate of 1.0 L/acre may be used with Preharvest applications or when controlling in summerfallow situations.

Metsulfuron plus 2,4-D - Apply 2 to 3 g/acre Ally plus 0.34 to 0.45 L/acre 2,4-D LV ester or amine (500 g/L formulations) in 10 gallons/acre (45 L/acre) water for toadflax suppression in wheat, barley, and creeping red fescue. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

Thifensulfuron/tribenuron - In registered crops, apply 8 g/acre of DG formulations or 12 g/acre of Refine SG in 10 gallons/acre (45 L/acre) water for suppression of toadflax. Apply when toadflax is less than 15 cm (6 inches) in height. Add non-ionic surfactant at 0.2 L per 100 L spray solution.

Tordon 22K - In rangeland and grass pasture, apply 3.6 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

Western Snowberry (Buckbrush)

2,4-D amine or LV ester (500 g/L) - Apply 1.82 L/acre 2,4-D amine or LV ester in a minimum of 20 gallons/acre (90 L/acre) water in spring or early summer. Retreatment may be necessary the following year.

Dicamba plus 2,4-D LV ester (500 g/L) - Apply 1.48 L/acre dicamba tank mixed with 1.82 L/acre 2,4-D LV Ester in 20 gallons/acre (90 L/acre) water in spring or early summer after the leaves are fully expanded.

Escort - Apply 10 g/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water between mid-June and mid-August after the brush has leafed out, but before the leaves turn their fall colours.

Reclaim - In grass pastures and non-crop land, apply Reclaim A at 92 g per acre plus Reclaim B at 0.8 L per acre (20 acres per case) for 2 years of control.

White Cockle

2,4-DB - Apply Embutox 625 at 1.1 L/acre or Caliber 400 at 1.7 L/acre or Cobutox 600 at 1.1 L/acre for top growth control to registered crops only.

Express SG - Apply in a mix with glyphosate prior to seeding registered follow crops to control spring rosettes.

Mecoprop - Apply 2.2 L/acre in 18 gallons water/acre (*80 L/acre) for top growth control of established plants. Will also control seedlings. Apply to registered crops only.

Wolf Willow (Silverwillow)

Dicamba + 2,4-D amine or LV ester (500 g/L) - In grass pastures with no legumes, apply dicamba at 2.1 L per 1000 L of water with 2,4-D LV ester or amine at 4.0 L per 1000 L of water to the foliage of actively growing brush in the spring or early summer and wet the foliage until the point of runoff.

Reclaim - In grass pastures and non-crop land, apply Reclaim A at 92 g per acre plus Reclaim B at 0.8 L per acre (20 acres per case) for 2 years of control.

Wild Tomato

2,4-D or MCPA amine or ester (500 g/L) - Apply 0.34 to 0.45 L/acre to registered crops up to the 8 leaf stage of wild tomato.

Bromoxynil+MCPA ester - Apply 0.40 L/acre to registered crops from the 1 to 6 leaf stage of wild tomato.

Willow

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing brush.

Dicamba + 2,4-D - In grass pasture and rangeland only, apply dicamba at 1.7 L plus 2,4-D 500 amine at 3.24 L per acre in 20 to 30 gallons (90 to 135 L) of water per acre when leaves are fully expanded.

Glyphosate - As a non-selective spot treatment, apply 1.21 to 2.43 L/acre (360 g/L formulations or equivalent of other formulations) in 10 to 30 gallons/acre (45 to 135 L/acre) water in the summer through early fall when brush is actively growing.

Soil Residual Herbicides

When applied at recommended rates in a crop, most herbicide residues will disappear within a few weeks after application and impose no restriction on cropping options the next year. However, some herbicide residues do not degrade quickly, and can persist in the soil for months or years following application, thereby restricting the crops that can be grown in rotation. Herbicide residues in the soil are deactivated in various ways including:

- Break down by chemical reactions,
- Break down by soil microbes,
- Escape to the atmosphere as a gas (volatilization),
- Break down by light (photodegradation),
- Leaching,
- Binding to soil particles.

Herbicides often disappear from the environment by more than one of these mechanisms. Many herbicides considered to be non-residual are bound temporarily to soil particles while they are broken down gradually by either soil microbes or chemical reactions. The binding action insures that the herbicide is not available to the crop in quantities that will cause damage.

As a general rule, breakdown processes are favoured by warm, moist soil conditions. During the winter, when the ground is frozen, and in the summer when the soil is dry, herbicide degradation is reduced. The residual activity of certain herbicides is also affected by soil organic matter and soil pH. These soil factors are seldom uniform across a field.

Herbicide carryover is aggravated by low levels of organic matter and is more likely to occur on eroded hilltops than in other parts of a field. The risk of herbicide carryover will also be greater in sprayer overlaps which are most common around headlands and slough margins.

Growers should be aware of the residual properties before applying any herbicide if they are to avoid cropping restrictions in following years. Knowledge of the limitations associated with herbicides that leave a soil residue, along with an accurate record of application (i.e. rates, locations) will serve to minimize rotational problems. Each herbicide used in mixes should be considered separately.

Soil tests using chemical extraction cannot always give a good indication of the potential injury risk from herbicide residue because of the influence of organic matter, clay and pH. Because of this, a field bioassay or laboratory bioassay, where plants are grown directly in the treated soil are best for detecting the potential for injury. These tests are not intended to be used to shortcut restrictions on the label, but provide information on rotational crops where none is available.

Injury symptoms from other causes can resemble herbicide carryover injury (i.e. cold weather, flooding, drought, insects, diseases, etc.). Consult with your local agronomist on potential causes before spending money on testing.

Herbicides that leave a soil residue and are of particular concern in Western Canada are found in the following chart.

Re-cropping Restrictions for Residual Herbicides:

Figures listed are the number of cropping seasons before each crop can be grown ("1" means that the crop can be grown the year following application). For plant-back restrictions less than one season; the delay is indicated with a "d" for number of days or with "mths" for the number of months. A blank space means that there are no recommendations given on the product label and a field bioassay is recommended by many product manufacturers to determine if these crops are safe to plant. A field bioassay is a strip of a test crop that covers an area of the field that is representative of the field variation and should include an untreated area.

PRODUCT	Alfalfa	Barley	Canaryseed	Clearfield canola	Non-Clearfield canola	Fababeans	Field corn	Dry beans	Field peas	Flax	Forage grasses	Lentils	Mustard†	Oats	Potatoes	Rye	Soybeans	Sunflowers	Wheat (durum)	Wheat (spring)	Wheat (winter)
2,4-D*	1	1	1	1	1		1	1	1	1	1	1		1		1			1	1	1
Absolute*		1	1	1	2					2				1					1	1	
Accent		1					1													1	
Adrenalin, Solo, Viper ADV		1	1	1	1				1	1		1		1					1	1	
Altitude FX		1	1	1	1				1	1		1		1						1	
Amitrol		1d	1	1d	1d		10d*	10d*	5d*	1		1	1	1			6d	1	1d	1d	1d
AAtrex, Primextra II Magnum						1*	1		1*	1*											
Ares		1	1	1	2		1		1	2		1		1				2	2	1	
Authority / Authority Charge	1			2	2		1										1	1		1	1
Avadex	0	0	0	0	0	1	1	1	0	0		1	0	2		1	1	1	0	0	0
Barricade, Fluroxypyr + 2,4-D, Retain, Trophy	2	1	2	1	1	2	2	2	1	1	1	1	1	1	2	1	2	2	1	1	1
Battalion		1					1														1
Curtail M, FlaxMax DLX, Prestige XC	2	1	2	1	1	2	1	2	1*	1	1	2	1	1		1	2	2	1	1	1
Dicamba*		1		1*	1*		1	1*						1			1		0*	0*	1
Dual II Magnum							1								1		1				
Eclipse III, Lontrel 360		1		1	1					1	1		1	1		1			1	1	
Edge	0		2	0	0	0		0	0		2	0	0	2			0	0	1*	1*	
Express Pro		1d		10 mths	10 mths				10 mths										1d	1d	1d
Flucarbazone, Everest GBX, Pre-Pare, (Brown soils)																				1	
Flucarbazone, Everest GBX, Pre-Pare, (Dark Brown soils)		1*		1*	1*				1*	1*									1	1	
Flucarbazone, Everest GBX, Pre-Pare, (Black soils)		1*		1*	1*			1*††	1*	1*									1	1	
Flucarbazone, Everest GBX, Pre-Pare, (Grey-Wooded soils)		1*		1*	1*				1*											1	
Flumioxazin	1	1		1	1		1	1							1		0	1	1	1	1

PRODUCT	Alfalfa	Barley	Canaryseed	Clearfield canola	Non-Clearfield canola	Fababeans	Field corn	Dry beans	Field peas	Flax	Forage grasses	Lentils	Mustard†	Oats	Potatoes	Rye	Soybeans	Sunflowers	Wheat (durum)	Wheat (spring)	Wheat (winter)
Frontier Max							0*	0*													1
Frontline XL, Frontline 2, 4-D, Spectrum		1		1	1				1*					1					1	1	1
Imazamethabenz (Black and Grey Wooded soils)		1	2	1	1				1	1				2				1	1	1	
Imazamethabenz (Brown and Dark Brown soils)		1	2	1	2				2	2				2				1	1	1	
Imazethapyr	1	1		0					0			1								1	
Infinity	1	1	1	1	1		1		1	1		2		1			1		1	1	
Kerb	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Metrbuzin				2	2	0			0						0*		0*	2			
Metsulfuron (pH less than 7, Brown and Dark Brown		1	4		2					2		3	4	1					1	1	
Metsulfuron (pH less than 7, other soils)		1	4		1					1		3	4	1					1	1	
Metsulfuron (pH 7 to 7.9, Brown and Dark Brown soils)		1	4		3					3		4	4	2					1	1	
Metsulfuron (pH 7 to 7.9, other soils)		1	4		2					3		4	4	1					1	1	
Muster	2	1	2		2	2		2	2	1	2*	2	2	1					1	1	1
Odyssey*, Odyssey DLX*	1	1	1	1	2		1		1	2		1		1				2	1	1	
Option	1	1		1	1		1	1	1					1	1		1			1	1
PrePass XC		0d		1	1				1					0d					0d	0d	1
Prism		1					1								1		1				0
Pulsar	2	1	2	1	1	2	2	2	1	1	1	1	1	2	2	1	2	2	1	1	1
Reflex*							1	0									1			1	0
Simplicity		1		1	1				1	1		1	1	1			1			1	
Stellar		1		1	1				1					1					1	1	1
Tandem		1		1	1				1	1		1	1	1						1	
Trifluralin	0	1*	2	0	0	0	1*	0	0	1*	2	0	0	2		0	0	0	1*	0*	1*
Triton C*		0		1	1				1	2*		2*						1	0	0	
Ultim		1					1														1
Velocity m3	1	1	1	1	1		1*		1	1				1			1		1	1	1

* The minimum re-cropping intervals are listed. These intervals may be longer than those listed depending on the use rates, region, province, soil types, environment, time of application and crop varietiy. Refer to product page for more information.

** Drought restrictions apply to drought conditions (80% of normal June to September rainfall) for high pH soils (greater than pH 7.5) and severe drought (less than 65% of normal June to Sept. rainfall) for all soils.

† May not be valid for all varieties or crop types. See product page for details.

†† DO NOT grow dry beans the year following Everest GBX application.

0 - May be seeded or reseeded the year of application. No re-cropping restrictions. 1 - Next cropping season after application. 2 - Two cropping seasons after application. NR - Not recommended.

Note: The re-cropping intervals listed may not be sufficient to prevent crop injury during periods of below average rainfall.

Effect of Rainfall on Herbicide Efficacy

Required Interval	Product
15 minutes	Diquat
30 minutes	clodinafop
1 hour	Axial, Barricade, Broadband, Bromoxynil, Bromoxynil/MCPA ester, clethodim, Equinox, fenoxaprop, flucarbazone Gramoxone, Harmony SG, Infinity, Poast Ultra, quizalofop, Signal D, thifensulfuron/tribenuron, tralkoxydim, Traxos, Tundra, Velocity m3
2 hours	2,4-D LV Ester, metsulfuron+2,4-D LV Ester, Atrazine (post-emergent applications), fluroxypyr + 2,4-D ester, MCPA Ester
3 hours	dicamba/mecoprop-p/MCPA , Odyssey, Odyssey DLX
4 hours	Accent, metsulfuron + 2,4-D Amine, 2,4-D Amine, Battalion (post-emergent application), Liberty (both), MCPA Amine, Overdrive, Prism, Reflex, Simplicity, Tandem, Ultim
6 hours	Assert FL, Avenge, Blazer, Curtail M, glyphosate/dicamba, imazamethabenz, MCPA-K, MCPA Sodium Salt, Muster, Option, Prestige XC, Metribuzin, Tordon 22K, Triton C
8 hours	Basagran, CleanStart
No specific recommendation*	2,4-DB, Adrenalin, Aim, Altitude FX, Amitrol 240, Bromoxynil/2,4-D ester, dicamba, dichlorprop/2,4-D, DyVel, DyVel DSp, Escort, Express Pro, Frontline XL, Frontline+2,4-D, glyphosate, Grazon, Harmony K, imazethapyr, Linuron, Lontrel, MCPB/MCPA, mecoprop-p, Optica Trio, Pinnacle, PrePass, Pulsar, Reclaim, Restore, Solo, Spectrum, Stellar, Tensile, Titanium, tribenuron, Triton K, Trophy, Viper

* The products listed make no specific time recommendation on the label. The required rainfree period could be up to 8 hours. See the product page in the guide or consult the product label.

Note: The term "Rainfastness" refers to the time needed between application and rainfall to avoid significant reduction in efficacy. Rainfall shortly after application of most post-emergent herbicides may reduce weed control. Effect will vary with product, the interval between spraying and rainfall and the intensity and duration of the rainfall. These guidelines are based on label information. Use the longest time interval on the component products when considering tank mixes.

Products Available as Prepackaged Tank Mixes

Product Name (Manufacturer)	Component 1 or A	Component 2 or B	Component 3 or C	Crops	Weeds Controlled	Area Treated per Package
Absolute (BASF Canada)	Odyssey	Lontrel Dry		CLEARFIELD canola	See component products	40 acres or 16 ha
Achieve Liquid Gold (Nufarm)	Achieve Liquid	Buctril M	Turbocharge (adjuvant)	Wheat (spring, durum, winter), barley	See the weeds of the component products plus tame buckwheat	20 acres or 8 ha
Axial iPak (Syngenta)	Axial	Infinity	Adigor (adjuvant)	Spring wheat (NOT including durum), barley	See component products	40 acres or 16 ha
Eclipse III (Dow AgroSciences)	Lontrel (Eclipse A)	Vantage Plus Max II (Eclipse III B)		Roundup Ready Canola varieties	See component products	40 acres or 16 ha
FlaxMax DLX (BASF)	Equinox	FlaxMax	Merge (adjuvant)	Flax	See component products	20 acres or 8 ha
Harmony SG (E. I. duPont)	Refine SG	Harmony Grass	Score (adjuvant)	Spring wheat (including durum)	Weeds controlled by Refine SG plus wild oat, green foxtail	40 acres or 16 ha
Harmony K (E. I. duPont)	Refine SG	Harmony Grass	dicamba	Spring wheat (NOT including durum)	Weeds controlled by Refine SG plus wild oat, green foxtail & group 2 resistant kochia	40 acres or 16 ha
Odyssey DLX (BASF)	Odyssey	Equinox	Merge (adjuvant)	Field peas, CLEARFIELD lentil	See component products	40 acres or 16 ha
Refine M (E. I. duPont), Broadside (Viterra)	Refine SG	MCPA Ester		Spring wheat (including durum), barley, oat, winter wheat	See component products	80 acres or 32 ha
Pace (Syngenta), Pre-Pare Complete (Viterra)	Pre-Pare (flucarbazone)	glyphosate		Prior to seeding spring wheat (NOT durum)	See compnonent products	60 acres (Prepare Complete) or 160 acres (Pace)
Signal D (Nufarm)	Approve	Foothills	Foothills (adjuvant)	Spring wheat (including durum)	See component products	20 acres or 8 ha
Signal M (Nufarm)	Mextrol 450	Foothills	Foothills B (adjuvant)	Spring wheat (including durum)	Weeds controlled by Mextrol 450 plus wild oat.	20 acres or 8 ha
Tensile	Solo	Lontrel Dry		CLEARFIELD canola	See component products	40 acres or 16 ha
Titanium (Nufarm)	Achieve Liquid	Approve	Turbocharge (adjuvant)	Wheat (spring, durum, winter), barley	See the weeds of the component products plus tame buckwheat	20 acres or 8 ha
Triton K (E. I. duPont)	Express SG	2, 4-D LV Ester	Banvel II	Spring wheat, barley	See component products	40 acres or 16 ha
Viper (BASF)	Solo	Basagran Forté		Field Pea	See component products	40 acres or 16 ha

Note: *See the component products listed for information concerning staging, application information, safety precautions, the effect of weather and grazing, re-cropping, harvest interval and storage precautions.*

The more stringent recommendation of the two products should be followed. Mix products in the order listed.

Herbicide Product Pages

2,4-D

Herbicide Group
4 - 2,4-D
(Refer to page 38)

Company and Formulation:

	PCP # (Product Name)	
	*600 Amine**	*700 Ester***
IPCO	17511	27819
Nufarm Agriculture	14726	27820
United Agri-Products	5931	27818 (Salvo)
Viterra	29248	29006
Farmers of North America		30460 (MPower 2,4-D)

* formulated as a solution.
** formulated as an emulsifiable concentrate.

Crops, Rates and Staging:

Application rates for individual products may vary from those listed. Refer to the label for product specific use rates. Rates greater than those listed may cause crop injury.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

CROP	MAXIMUM SAFE RATE (L/ACRE)	STAGE
Wheat, barley, spring rye	0.38 (600 g/L) 0.32 (700 g/L)	4 leaf to early flag leaf.
Fall rye, winter wheat*	0.36 (600 g/L) 0.32 (700 g/L)	In spring, apply after winter cereals begin grow but before emergence of the flag leaf. From full tillering to prior to flag leaf stage.
Corn*	0.40 (600 g/L) 0.32 (700 g/L)	Apply as an overall spray before corn is 6 inches (15 cm) tall and before the 6-leaf stage. After 6 inches (15 cm) use a directed spray. Avoid making applications under hot/humid conditions onto corn.
Seedling and established grasses for forage and seed production*	0.38 (600 g/L) 0.32 (700 g/L)	Apply from the 3 leaf stage to emergence of the flag leaf of seedling grasses. For established grasses for seed production, apply in spring up to emergence of the flag leaf.
Established forage grass *(not for seed production)**	0.77 (600 g/L) 0.65 (700 g/L)	Apply in spring up to emergence of the flag leaf of established grasses, or in the fall after harvest.
Established grass pastures	1.62 (600 g/L) 1.90 (700 g/L)	No restrictions, apply when weeds are actively growing. For control of brush species, apply at time of rapid growth (usually May to mid-June, and September prior to colour change).
Turf*	0.77 (600 g/L) 0.77 (700 g/L)	Apply in spring and early September on established turf. Do not use on bent grasses, or newly seeded stands.

* Note: Registered for use only with certain brands of 2,4-D; use of non-registered products is at the risk of the user.

Weeds, Rates and Staging:

Apply at lower rates when weeds are small (2 to 4 leaf stage) and actively growing. Higher rates are needed when weeds are larger, in heavy populations, or growing under stressful conditions (excessively cold, hot, dry or wet).

Note: The rates listed differ slightly from product to product. Check individual product labels for exact use rates.

Susceptible Weeds:
0.22 to 0.38 L per acre (600 g per L)
0.19 to 0.32 L per acre (700 g per L)

Bluebur
Burdock
Cocklebur
False flax
Flixweed (late fall application or spring seedlings)
Goat's-beard
Kochia
Lamb's-quarters
Mustards (except dog and tansy mustard)
Narrow-leaved hawk's-beard (fall application to seedlings or spring application at 1-2 leaf stage)
Plantain
Prickly lettuce
Ragweed (common, false and giant)
Russian pigweed
Russian thistle
Shepherd's-purse**
Stinging nettle
Stinkweed**
Sweet clover
Thyme-leaved spurge
Volunteer canola (including all herbicide tolerant varieties)
Wild radish
Wild sunflower

Harder to kill weeds:
0.40 to 0.61 L per acre (600 g per L)
0.34 to 0.53 L per acre (700 g per L)

Annual sow-thistle
Blue lettuce*
Burdock (top growth only of bolting plants)
Canada thistle***
Common chickweed
Common groundsel**
Common peppergrass
Dandelion*
Flixweed (spring prior to bolting)
Knotweed
Lady's-thumb
Leafy spurge*
Mustard (dog & tansy)
Narrow-leaved hawk's-beard (spring prior to bolting)
Oak-leaved goosefoot
Pineappleweed
Prostrate pigweed
Purslane
Redroot pigweed
Russian thistle
Sheep sorrel
Tumble pigweed

Top Growth Control only (at rates for harder to kill weeds):

Biennial wormwood
Bull thistle
Buttercup
Curled dock
Field bindweed
Gumweed
Hedge bindweed
Hoary cress
Horsetail
Mouse-eared chickweed
Perennial sow-thistle
Russian knapweed
Tartary buckwheat
Volunteer sunflower

* Control of seedlings at rates given above and top growth control only of established plants.

** Spring seedlings. Winter annual weeds - apply in late fall or early spring prior to bolting.

*** Suppression only - Apply when Canada thistle plants are actively growing and have 6 to 8 inches (15 to 20 cm) of new growth. Regrowth will be present the following spring and in-crop treatments will be required.

Formulation Characteristics:

Formulation	Risk of Vapour Drift	Activity on Weeds	Risk of Crop Injury
LV Ester	Medium	Fast	Medium
Amine	Very Low	Medium	Low

Application Information:

Water Volume: Minimum 20 L per acre - ground application. Water rates depend on product and use. Consult label for details.

Higher application volumes (40 L/acre or greater), reduce the risk of crop injury.

Nozzles and Pressure: 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressures designed to deliver proper coverage with *ASABE* coarse droplets.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Best weed control occurs when temperatures are above 21°C (daytime) or 10°C (nighttime) and humidity is above 70 percent. DO NOT apply if temperature exceeds 27°C.

Tank Mixes:

Mixes listed may not occur on all products labels. Check individual product labels for registered mixes.

Note: Following list is for mixes listed on *2,4-D* labels only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Herbicides:
Wheat and barley:
Banvel (*2,4-D amine* only)

Fertilizers: None registered.

Insectcides: None registered.

Fungicides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: ***2,4-D amine:*** within 4 hours will reduce control. ***2,4-D LV ester:*** within 2 hours will reduce control.

Re-entry: DO NOT enter treated fields for at least 12 hours

Grazing: DO NOT permit lactating dairy animals to graze fields within 7 days of application. Do not harvest forage or cut for hay within 30 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.

Re-cropping: No recropping guidelines are provided on the labels. As a general guideline, there should be no cropping restrictions the year following an in-crop treatment.

Aerial Application: Some formulations may be applied by air. Check the label for detailed instructions.

Storage: *2,4-D LV ester* may be frozen. *2,4-D amine* requires heated storage.

Buffer Zones:

Crop	Application method	Buffer Zones (metres†) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Field Crops	Ground*	1	0	0
	Fixed wing aircraft	10	0	45
	Helicopter	10	0	40
Fallow, stubble, pastures, range-land	Ground*	1	1	2
	Fixed wing aircraft	15	0	60
	Helicopter	15	0	50
Turf	Ground only*	1	0	1

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy. Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.
Handheld or backpack sprayers do not require a buffer zone.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Warning – Poison

Danger Poison – Ester 700 Formulations

For an explanation of the symbols used here see page 11.

2,4-DB

Herbicide Group
4 - 2,4-DB
(Refer to page 38)

Company:

IPCO (*Cobutox*– PCP#27911)
Nufarm Agriculture (*Embutox*– PCP#27912)
United Agri Products (*Caliber*– PCP#27910)

Formulation:

625 g/ L 2,4-DB formulated as an emulsifiable concentrate.
Container size - 10 L.

Crops and Staging:

NOTE - When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

CROP	STAGE
Seedling alfalfa, bird's-foot trefoil*	1 to 4 trifoliate leaf stage
Clover (alsike**, red**, white, Dutch but **NOT** sweet clover)*	As soon as possible after emergence of the 1st trifoliate leaf
Wheat, barley or oats	5 leaf to emergence of the flag leaf
Field corn	15 inches (38 cm) to prior to tassling using drop nozzles.
Pastures containing forage legumes	After cutting or grazing and regrowth less than 3 inches (7.5 cm)

* With or without a cereal cover crop.
** Alsike and red clovers may be damaged by 2,4-DB applications.

Seedling Forage Grasses*:

Apply from 2 to 4 leaf stage of:

Bromegrass (smooth)
Fescue (creeping red, meadow, tall)
Orchard grass
Timothy
Wheatgrass (crested, intermediate, streambank, tall)

* Not for seed production. Not for feeding in the establishment year.

Weeds and Staging:

Weeds controlled at the 0.71 L per acre rate from the 2 to 4 leaf stage at lower recommended rates include:

Ball mustard
Lamb's-quarters
Ragweed
Redroot pigweed
Shepherd's-purse
Stinkweed
Wild mustard
Wormseed mustard

Weeds controlled at higher recommended rates (0.91 to 1.1 L/acre) include:

WEED	STAGE
Bull thistle	Rosette to early bud stage
Canada thistle*	6 in. (15 cm) to early bud
Chicory	Rosette
Curled dock**	Young and actively growing
Dandelion*	Prior to bud
Field bindweed*	Late summer
Green smartweed**	Seedlings
Horsetail*	4 to 5 inches (10 to 13 cm)
Narrow-leaved hawk's-beard	Apply at rosette stage after alfalfa has gone dormant
Oak-leaved goosefoot	Up to 2 leaf stage
Perennial sow-thistle*	Rosette
Lady's-thumb**	Seedlings
Plantain	Prior to flowering
Wild buckwheat	Up to 2 leaf stage
Wild Radish	Up to 2 leaf stage
Yellow rocket	Late September to mid-October

* Top growth control
** Suppression
Refer to individual product labels for details on application rates to use for different weed species.

Rates:

CROPS	RATE (L/ACRE)	ACRES TREATED PER CONTAINER
Cereals, seedling forage legumes and grasses	0.71 to 0.91	14.1 to 11.0
Corn and pastures containing forage legumes	0.71 to 1.11	14.1 to 9.0

Application Information:

Water Volume: 61 to 81 L per acre.

Nozzles and Pressure: 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressures designed to deliver proper coverage with a minimum of fine droplets.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Severe damage to legumes can occur if high temperatures (more than 27°C) or high humidity prevail at the time of application. DO NOT apply under dry soil/drought conditions.

Tank Mixes:

Herbicides:

Underseeded Legumes: *MCPA* amine (28 mL/acre*)
* 500 g/L formulation

This tank mix may increase crop damage (stunting).

Follow all precautions and restrictions on both product labels.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on 2,4-DB labels only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Not specified on the label. A period of up to 8 hours may be required. Contact the manufacturer for more details.

Grazing: DO NOT graze or cut treated crops or forage until 30 days after application.

Re-cropping: No restrictions the year after application.

Aerial Application: DO NOT apply by air

Storage: May be frozen.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Caution – Poison

For an explanation of the symbols used here see page 11.

AAtrex Liquid

Herbicide Group
5 - atrazine
(Refer to page 38)

Company:

Syngenta (PCP#18450)

Formulations:

480 g/L atrazine formulated as a liquid suspension.

Container sizes: Various.

Crops, Rates and Staging:

Corn (silage, field, sweet): 0.85 to 1.25 L per acre* using the following application methods;

Pre-plant incorporated (PPI).

Pre-emergent surface (after planting but before emergence of weeds and crop): Recommended only on irrigated fields. Inconsistent weed control will occur if 0.5 inches (1.25 cm) of water/precipitation does not occur within 7 days of application.

Post-emergence: 1 to 6 leaf stage and when corn is less than 12 inches (30 cm) tall. Add 1.11 to 2.23 L per acre of oil concentrate or 6.88 L per acre crop oil. Crop injury may occur when *Aatrex* and oil is applied post-emergence during cold weather.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

* Use the low rate on crops grown on sandy soils, and where weed infestations are light.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Weeds and Staging:

For pre-plant incorporated, pre-emergent and post-emergent (when weeds are less than 4 inches or 10 cm tall) control of the following weeds:

Common purslane
Lamb's-quarters
Ragweed
Redroot pigweed
Smartweed (including lady's-thumb)
Volunteer clover
Wild buckwheat
Wild mustard
Wild oats
Wormseed mustard

Application Information:

Water Volume: Minimum 61 L per acre.

Nozzles and Pressure: 30 to 45 psi (200 to 300 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift. Use a 50 mesh or coarser screen and filter system.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Post-emergent applications made during periods of cold weather may cause crop lightening. Hot, dry weather preceding post-emergent applications may result in reduced weed control. *Aatrex* will move with soil if eroded.

Tank Mixes:

Herbicides:

Pre Plant Incorporated: *Dual II Magnum*

Pre-Emergent: *Dual II Magnum*

Post-Emergent*: *Banvel II* (not sweet corn), *Pardner, Dual II Magnum* and *Buctril M***.

* DO NOT use oils or adjuvants with post-emergent tank mixes.

** DO NOT treat after the 6 leaf stage, crop injury may occur.

Fertilizers: For pre-emergence applications, nitrogen solutions or complete liquid fertilizers may replace all or part of the water as a carrier. *AAtrex* may be impregnated onto dry granular fertilizers. DO NOT impregnate onto nitrate, super-phosphate or limestone.

DO NOT apply Aatrex with nitrogen fertilizer after corn has emerged, as crop injury will occur.

Insecticides: None registered.

Note: The above mixes are those listed on the Aatrex label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. See the general guidelines for mixing pesticides for more information.

Restrictions:

Rainfall: Within 2 hours of post-emergence applications may result in reduced weed control.

Grazing: DO NOT graze or cut for feed before ear emergence.

Preharvest: Leave at least 45 days from application to harvest for sweet corn and 60 days for field corn.

Re-cropping: All crops, except corn and triazine-tolerant canola, may be affected the year following the use of atrazine. Flax, peas and fababeans have some tolerance to atrazine residues and are usually not affected by rates of up to 0.9 L per acre applied the previous year. Other more sensitive crops may be affected 2 or more growing seasons after application.

Aerial Application: DO NOT apply by air.

Storage: DO NOT freeze.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:	
	Aquatic Habitats	Terrestrial habitat
Ground only*	10	10

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

DO NOT mix or load within 30 m of any wells, lakes, streams, ponds, dugouts or sinkholes.

Tank Cleaning:

When finished spraying atrazine, run clean water through the tank, pump and lines. Drain and refill with 1 L of 3% household ammonia solution per 100 L water. Circulate the solution through lines and nozzles. Let solution stand for several hours. Scrub inside surfaces but do not enter tank. Flush sprayer system with water.

DO NOT clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Refer to page 14 for additional information.

Hazard Rating:

▽ Caution – Eye Irritant

KEEP OUT OF REACH OF CHILDREN.

Harmful if swallowed.

For an explanation of the symbols used here see page 11.

Absolute*

Herbicide Group
2 - imazamox & imazethapyr
4 - clopyralid
(Refer to page 38)

This product is a prepackaged tank mix of *Odyssey* at 17 g per acre (page 228) and *Lontrel Dry* (*Lontrel Dry* is only available with *Absolute* and *Tensile*) at 80 g per acre (page 210). Information listed is restricted to Crop, Weeds and Rates. For other detailed information on the effect of growing conditions, and restrictions for the component products see the product pages listed above.

Company:

BASF Canada

Formulation:

Absolute package contains 2 components:

***Odyssey* (PCP#25111):** 35% imazamox and 35% imazethapyr formulated as a dispersible granule.

***Lontrel Dry* (PCP#27306):** 75% clopyralid formulated as a dispersible granule.

Container size - 4 packs per case (800 g *Lontrel Dry* plus 2 x 86.5 g *Odyssey* per pack), (one case treats 40 acres).

** NOTE: This formulation is no longer manufactured, but some supplies may still remain in the distribution system. This product may be removed from future editions of this publication.*

Crops and Staging:

CLEARFIELD canola varieties from the 2 to 6 leaf stage. Apply only to CLEARFIELD canola (Argentine – B. napus) varieties. DO NOT apply to Oilseed quality *Brassica juncea*. Application to any other variety of canola or any other crop will result in crop death.

Weeds and Staging:

The weeds controlled by *Odyssey* plus:.

Top growth control of Canada thistle (rosette to pre-bud stage) for 6-8 weeks.

Rate:

***Odyssey*:** 17.3 g per acre.

***Lontrel Dry*:** 80 g per acre. (Equivalent to 0.17 L per acre of *Lontrel 360*)
One case treats 40 acres.

***Merge*:** 0.5 L per 100 L of spray solution (sold separately). At a spray volume of 40 L per acre one 8.1 L jug of *Merge* will treat 40 acres. *Absolute* MUST be applied with *Merge* adjuvant.

DO NOT apply *Absolute* more than once or follow *Absolute* with any related products (*Odyssey, Solo, Lontrel*) in the same per year.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

See *Odyssey* and *Lontrel* pages for information on restrictions, application details, impacts of growing conditions and handling. Use the most limiting restrictions across all components for the mix.

Accent*

Herbicide Group
2 - nicosulfuron
(Refer to page 38)

Company:

E. I. duPont Canada (PCP#25116)

Formulation:

75% nicosulfuron formulated as a water dispersible granule.

Container size - 133.6 g (4 x 33.4 g water soluble bags per pouch).

Crops and Staging:*

Field Corn: 1 to 8 leaf stage (six visible collars), coleoptile (short, blunt leaf) is counted as the first leaf.

Sweet corn **: 1 to 6 leaf stage (4 visible collars).

** NOTE - Since applications to field and sweet corn in western Canada has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance.* ***Application to corn is at the risk of the user.***

*** Note that Accent is registered for use on all sweet corn varieties but tolerance may vary depending on variety. Krispy King, Jubilee and Jubilee Supersweet are the only varieties that have been tested for tolerance in western Canada. Test on small areas planted to other varieties for tolerance prior to widespread use.*

Weeds and Staging:

WEEDS	STAGING
Barnyard grass, green foxtail, yellow foxtail*, old witchgrass	1 to 6 leaves (up to 2 tillers)
Quackgrass	3 to 6 leaves (with extended leaf 4 to 8 inches (10 to 20 cm) long)
Wild oats	3 to 6 leaves

* Suppression only

The best control and yield response is achieved by applying at the earlier end of the leaf stage ranges.

Rates:

13.5 g per acre. Add non-ionic surfactant (Citowett Plus, Agsurf or Agral 90) at 0.2 L per 100 L of spray solution.

One water soluble bag will treat 2.5 acres (1 ha).

One pouch will treat 10 acres (4 ha).

Refer to the product label for complete mixing instructions.

A general guide to mixing can be found on page 13.

Application Information:

Water Volume: Minimum 40 L per acre; optimum 56 to 77 L per acre.

Nozzles and Pressure: 25 to 40 psi (175 to 275 kPa) when using conventional flat fan nozzles tilted forward at a 45° angle. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressures designed to deliver proper coverage with ***ASABE medium*** droplets. Use a 50 mesh or coarser screen and filter system.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Poor weed control or crop injury may result if at the time of application, plants are under stress from disease, insect or nematode injury, carryover of herbicide from a previous years application, abnormally hot or cold weather, drought, water-soaked soils, hail damage or frost. Delay application until stress passes and both corn and weeds have resumed growth. When corn is injured by frost, wait 48 to 72 hours after normal growing conditions have resumed before applying *Accent*. Stress conditions after application may also result in injury or poor weed control.

Tank Mixes:

Herbicides:
Field corn only:
Banvel II (0.24 L/acre) plus surfactant.
Pardner (0.4 L/acre) plus surfactant.

Fertilizers: Do not mix with fertilizers.

Insecticides: None registered. Accent *should not be applied to corn that has been treated with* Thimet, *or other organophosphate insecticides. Leave 7 days between the application of Accent and that of a foliar organophosphorous insecticide.*

Fungicides: None registered.

Note: The above mixes are those listed on the *Accent* label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Restrictions:

Rainfall: Within 2 to 4 hours of application may result in reduced weed control.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze treated crops or cut for hay.

Preharvest: Leave at least 30 days in field corn and 40 days in sweet corn from application to harvest.

Re-cropping: Corn, and spring wheat and barley may be seeded the year following *Accent* application. For all other crops, a field bioassay is recommended before planting.

Aerial Application: DO NOT apply by air.

Storage: Store product in original containers in a secure, dry area, away from other pesticides, food or feed.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of Terrestrial habitat
Ground only*	2

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Leave a 5 m buffer between the last spray path and woodlots or shelterbelts. Leave a 22 m buffer before wetland areas or water bodies.

Tank Cleaning:

Drain tank and hose down interior surfaces. Flush tank, hoses, boom, and nozzles with clean water for a minimum of 5 minutes. Fill spray tank with a water-ammonia cleaning solution (1 litre of a minimum 3% household ammonia for every 100 L of water). Flush hoses, boom and nozzles with the cleaning solution, then add more water to completely fill the tank. Circulate for 15 minutes, then flush hoses, boom and nozzles with the cleaning solution, and drain the tank. Remove and clean the nozzles and screens separately in a bucket containing the cleaning solution as above. If the spray equipment is to be used to spray crops other than corn, repeat the above process and thoroughly wash the spray mixture from the outside of the spray tank and the boom. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing the water through the hoses and boom. Prior to using the sprayer again, flush the tank, boom and hoses for 5 minutes with fresh water. Do not clean equipment where cleaning solution could flow towards water bodies, ditches, cropland, shelterbelts, or areas where people are likely to frequent or walk.

For additional information, Refer to page 15.

Hazard Rating:

▽ Caution – Eye Irritant

KEEP OUT OF REACH OF CHILDREN.

Avoid breathing spray mist.

Avoid contact with skin, eyes and clothing.

For an explanation of the symbols used here see page 11.

Achieve Liquid Gold

Herbicide Group
1 - tralkoxydim
4 - MCPA
6 - bromoxynil
(Refer to page 38)

This product is the equivalent of a prepackaged tank mix of *tralkoxydim* (page 278) and *bromoxynil/MCPA ester* (page 113). Information listed is restricted to Crop, Weeds and Rates. For other detailed information on the component products see the product pages listed above.

Company:

Nufarm Agriculture

Formulation:

***Achieve Liquid Gold* contains 3 components:**

Achieve Liquid **(PCP#27011):** 400 g/L tralkoxydim formulated as a suspension concentrate.
Container sizes: 4 L; 4 x 20 L.

Mextrol 450 **(PCP#26999):** 225 g/L bromoxynil and 225 g/L MCPA ester formulated as an emulsifiable concentrate.
Container size - 10 L; 2 x 100 L.

Turbocharge **adjuvant (PCP#23135):**
Container size - 4 L; 2 x 40 L.

Crops and Staging:

Spring wheat (including durum), barley - 2 leaf to early flag leaf stage.

Winter wheat, fall rye - from the time growth begins in the spring to the early flag leaf stage.

Weeds and Staging:

Grass weeds: Same weeds and staging as tralkoxydim plus;
Broadleaf weeds: Same weeds and staging as bromoxynil/MCPA ester

Rates:

One case treats 20 acres or treats 400 acres.
Add *Turbocharge* at a rate of 0.5 L per 100 L spray solution.
If water analysis shows bicarbonate levels are 400 ppm or greater, add ammonium sulfate at 0.75 to 1.5 kg per 100 L water.

Refer to the product label for complete mixing instructions.

A general guide to mixing can be found on page 14.

Application Information:

Water Volume:

Ground: 20 to 40 L per acre. DO NOT apply with air assist sprayers set to apply less than 20 L per acre water volume as mixing problems or unacceptable crop injury could occur.

Aerial: 12 to 18 L per acre.

Nozzles and Pressure: 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Consult with herbicide manufacturer regarding the suitability of low drift nozzles for use with this product.

Use a 50 mesh or coarser screen and filter system.

Effects of Growing Conditions:

Crop Safety: Applications of *Achieve Liquid Gold* to crops prior to tillering and exposed to 4°C or lower 48 hours before or after spraying should be avoided to prevent the possibility of crop injury. Tillered cereals may incur injury if *Achieve Liquid Gold* is sprayed within 48 hours of 0°C or lower.

Tank Mixes:

Herbicides: *MCPA ester* (0.22 L/acre) (500 g/L formulations). A reduction in green foxtail control may occur with this tank mix.

Insecticides: *Matador* (25 to 34 mL/acre).

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Aerial Application: May be applied by air.

For additional information see the component products.

Adrenalin SC

Herbicide Group
2 - imazamox
4 - 2,4-D
(Refer to page 38)

Company:

BASF Canada (PCP#27879)

Formulations:

20 g/L imazamox and 560 g/L 2,4-D ester formulated as a suspension concentrate. Container size 2 X 8L.

Crops and Staging:

CLEARFIELD wheat varieties – 4 leaf to 6 leaf stage.

Apply only to CLEARFIELD wheat varieties; application to any other variety of wheat or any other crop will result in crop death.

Weeds and Staging:

Grasses:
Apply from 1 to 4 main stem leaves, up to a maximum of two tillers.

Barnyard grass
Foxtail (green and yellow)
Japanese brome*
Volunteer barley
Volunteer canaryseed
Volunteer tame oat
Volunteer wheat (non-Clearfield)
Wild oat

* Suppression only.

Broadleaves:
The following weeds will be controlled up to the 4-leaf stage under a wide variety of conditions. Application at an earlier weed stage provides the best yield response.

Annual smartweed species (including lady's thumb)
Annual sow-thistle
Bluebur
Cocklebur
Cow cockle
Daisy fleabane
False flax
Flixweed
Goat's-beard
Kochia
Lamb's-quarters
Mustards (except dog and tansy)
Narrow-leaved hawk's-beard
Plantain
Prickly lettuce
Persian darnel
Ragweeds
Redroot pigweed
Russian pigweed
Russian thistle
Shepherd's purse
Stinging nettle
Stinkweed
Sweet clover
Thyme-leaved spurge
Volunteer canola (all varieties)
Wild buckwheat
Wild mustard
Wild radish
Wild sunflower

The following weeds are suppressed up to the 4-leaf stage with Adrenalin SC when conditions are optimal for growth. Control may be reduced if weeds are found in high population densities, or are growing under stressful conditions (drought, cold, heat).

Biennial wormwood*
Blue lettuce*
Chickweed, common
Cleavers
Curled dock*
Dandelion*
Groundsel, common
Gumweed*
Hawkweed
Heal-all
Hedge bindweed*
Hemp-nettle
Horsetail
Knotweed
Leafy spurge*
Mustards (dog and tansy)
Oak-leaved goosefoot
Peppergrass, common
Pigweed, prostrate
Pigweed, tumble
Pineappleweed
Purslane
Russian knapweed*
Sheep sorrel*
Yellow rocket

* Only seedlings of biennial and perennial weeds will be controlled. Established plants emerging from roots will not be controlled.

Adrenalin SC *will give top growth control of the following weeds. Control may be reduced if weeds are found in high population densities, or are growing under stressful conditions (drought, cold, heat).*

Bull thistle
Burdock
Buttercup
Canada thistle
Field bindweed
Hoary cress
Perennial sow-thistle
Tartary buckwheat

Rate:

0.4 L per acre (One case treats 40 acres).

Add a non-ionic surfactant (such as *Agral 90 Ag-Surf* or *Surf 92*) at 0.25 L per 100 L of spray solution. Surfactant not included.

Use of an anti-foam agent is suggested.

DO NOT apply *Adrenalin SC* more than once or follow *Adrenalin SC* with any related product in the same year.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 40 L per acre.

Nozzles and Pressure: Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE* **coarse** droplets. Use a 50 mesh or coarser screen and filter system.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Initial crop injury may be observed after application but this is outgrown and should not affect yield. Severe crop injury will occur as a result of spray overlap. AVOID SPRAYER OVERLAP.

DO NOT spray if temperatures of +5°C or lower are forecast within 3 days of application. Treat crops during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced.

Tank Mixes:

None registered.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze the treated crop within 14 days of application or cut for hay within 42 days of application.

Preharvest Interval: DO NOT apply within 79 days of harvest.

Re-cropping: : Winter wheat may be seeded 3 months after application. Barley, canaryseed, canola (all varieties), chickpea, corn, field peas, flax, lentils, oats, sunflower, wheat (spring and durum) may be grown safely the year following an application. Condiment mustard may be grown the second season following *Adrenalin SC* application. Conduct a field bioassay the year before growing any other crop than those listed above.

Aerial Application: DO NOT apply by air.

Storage: DO NOT freeze. Store in a cool, dry place above 5°C.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	11	11	11

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

⚠ Caution – Causes eye and skin irritation.

For an explanation of the symbols used here see page 11.

Aim

Herbicide Group
14 - carfentrazone
(Refer to page 38)

Company:

FMC. Corp. (PCP#28573)
Distributed by NuFarm Agriculture.

Formulations:

240 g/L carfentrazone formulated as an emulsifiable concentrate.

Container sizes: 0.6 L, 1.2 L, 3.38 L

Crops, Rates and Staging:

Pre-Seeding:
From 14.8 to 29.5 mL per acre prior to the seeding of:

Sorghum

From 14.6 to 46.8 mL per acre prior to the seeding of:

Barley
Buckwheat
Canola (rapeseed)
Chickpea
Corn (field and sweet)
Dry bean
Field peas
Flax
Lentil
Millet (pearl and proso)
Mustard
Oats
Rye
Safflower
Soybean
Sunflower
Triticale
Wheat (including spring, winter and durum)

Use *Agral 90* or *Ag-Surf* at 0.25 L per 100 L of spray solution or use *Merge* at 1 L per 100 L of spray solution.

Harvest aid treatment*:

CROP	RATE (mL per acre)
Barley, oats, wheat, millet, dry bean, chickpea, field pea	29 to 47
Sorghum	29
Potato**	94 to 142

Use *Agral 90* or *Ag-Surf* at 0.25 L per 100 L of spray solution or use *Merge* at 1 L per 100 L of spray solution.

* DO NOT apply to crops if grown for seed purpose.

** A second application of 94 to 123 mL per acre may be applied in potato.

Weeds, Rates and Staging:

Apply to listed weeds up to ten (10) cm in height unless otherwise indicated:

WEEDS	RATE (mL per acre)
Redroot pigweed	14.6
Above weeds plus: Lamb's-quarters, Round-leaved mallow, Hairy nightshade, Stinkweed, Pigweed (Prostrate, Smooth, Tumble), Purslane, Tansy mustard, Tall waterhemp	23.2
Above weeds plus: Cocklebur, Kochia, Volunteer canola (all varieties), Eastern black nightshade,	29.2
Above weeds plus: Prickly lettuce, Corn spurry	46.8

Application Information:

Water Volume: Use a minimum of 40 L per acre. Higher spray volumes is required for dense weed stands. Weed control improves with the amount of coverage.

Nozzles and Pressure: Maximum 35 psi (210 kPa) if using conventional nozzles. Low drift nozzles may require higher pressure for proper performance. Use nozzles and pressure designed to deliver proper coverage with ***ASABE medium*** droplets.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Extremes in environmental conditions such as temperature, moisture, soil conditions, and cultural practices may affect activity. Under warm moist conditions, herbicide symptoms may be accelerated. While under very dry conditions, the expression of herbicide symptoms may be reduced as weeds hardened off by drought are less susceptible.

Tank Mixes:

Herbicides:

Pre-plant:

*Glyphosate** (0.5 to 1L per acre of 360 g/L formulation)

2,4-D Ester-700 (0.32 L per acre) (fallow only)

Harvest aid treatment:

*Glyphosate** (1L per acre of 360 g/L formulation)

*Reglone***(0.7 to 0.9 L/acre)

* IPA or K salt only.

** For potatoes only. If this mix is applied, neither the mix, nor the individual products may be applied following the first application of the mix.

Note: The above mixes are those listed on the *Aim* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Rainfall within 6 to 8 hours after application may reduce activity. Heavy rainfall shortly after application may reduce activity.

Re-entry: DO NOT enter treated fields for 12 hours.

Preharvest Interval: Leave 7 days between application and harvest for potatoes and 3 days for all other registered crops for harvest aid uses.

Grazing: DO NOT graze the treated crop or cut for feed.

Re-cropping: There are no rotational restrictions on crops registered for pre-seed use. All other crops may be planted 12 months after application.

Aerial application: DO NOT apply by air.

Storage: Store in a cool, dry place and avoid excess heat.

Buffer Zones:

Application method	Buffer Zones (metres) Required for the Protection of Terrestrial Habitat
Ground only*	5

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches above the crop canopy.

DO NOT apply in areas where surface water from the treated area can run off into aquatic habitats.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

▽ Caution – Eye and skin irritant

For an explanation of the symbols used here see page 11.

Altitude FX/Altitude FX 2

Herbicide Group
2 - imazamox
4 - fluroxypyr & MCPA
(Refer to page 38)

Company:

BASF Canada

Formulations:

Altitude FX contains 3 separate components. Each case contains:

***AC 299,263 120 AS* (PCP#26705):** 120 g/L imazamox formulated as a solution.
Container size - 1.34 L

***Starane* (PCP#24815):** 180 g/L of fluroxypyr formulated as an emulsifiable concentrate.
Container size - 4.8 L.

***MCPA ester 600* (PCP#27802):** 600 g/L of MCPA ester formulated as an emulsifiable concentrate.
Container size - 7.5 L.

Altitude FX 2 contains 2 separate components. Each Case treats 40 acres and contains :

***AC 299,263 120 AS* (PCP#26705):** 120 g/L imazamox formulated as a solution.
Container size: 2.68 L

***Starane* (PCP#24815):** 180 g/L of fluroxypyr formulated as an emulsifiable concentrate.
Container size: 9.6 L.

MCPA, 2,4-D, or *Curtail M* must be added and are purchased separately.

Crops and Staging:

CLEARFIELD wheat varieties: 3 leaf (after appearance of first tiller) to 6 leaf stage to ensure optimal crop tolerance. Apply only to CLEARFIELD wheat varieties; application to any other variety of wheat or any other crop will result in crop death.

Weeds and Staging:

Grasses:
Apply from 1 to 4 leaves, up to a maximum of two tillers.

Barnyard grass
Foxtail (green and yellow)
Japanese brome (suppression)
Persian darnel
Volunteer cereals (barley, canary seed, oat, non-CLEARFIELD spring wheat, durum)
Wild oat

Broadleaves:
Apply up to 4 leave stage unless otherwise indicated.

Annual sunflower
Burdock common
Chickweed
Cleavers (1 to 4 whorls)
Cocklebur
Common ragweed
Cow cockle
Flixweed
Green smartweed
Hemp-nettle (2 to 6 leaf)
Kochia
Lamb's-quarters
Mustards (except dog and tansy)
Prickly lettuce
Redroot pigweed
Round-leaved mallow*
Russian thistle*
Shepherd's-purse
Stinkweed
Stork's-bill (1 to 8 leaf)*
Vetch
Volunteer canola (all varieties)
Volunteer flax (1 to 12 cm)
Wild buckwheat
Wild radish

* Supression

Rates:

Altitude FX (1 case treats 20 acres)

AC 299,263 120 AS: 67 mL per acre.

Starane: 0. 24 L per acre.

MCPA 600 Ester: 0.38 L per acre.

Add a non-ionic surfactant (such as *Agral 90 Ag-Surf* or *Surf 92*) at 0.25 L per 100 L of spray solution. Surfactant not included.

Altitude FX 2 (1 case treats 40 acres)

AC 299,263 120 AS: 67 mL per acre.

Starane: 0. 24 L per acre.

Altitude FX 2 must be tank mixed with one of the registered tank mix options found under the "tank mix" section below. Add a non-ionic surfactant (such as *Agral 90 Ag-Surf* or *Surf 92*) at 0.25 L per 100 L of spray solution. Surfactant not included.

DO NOT apply *Altitude FX/ FX 2* more than once or follow *Altitude FX/ FX 2* with *Adrenalin* or any product containing fluroxypyr prior to harvest.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 20 to 40 L per acre.

Nozzles and Pressure: Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE* coarse** droplets. Use a 50 mesh or coarser screen and filter system.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Initial crop injury may be observed after application but this is outgrown and should not affect yield. Severe crop injury will occur as a result of spray overlap. AVOID SPRAYER OVERLAP.

DO NOT spray if temperatures of +5°C are forecast within 3 days of application. Treat crops during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced.

Tank Mixes:

Herbicides (For *Altitude FX 2* only):

MCPA Ester 600 (0.38 L/acre)
2,4-D Ester 700 (0.32L/acre)
Curtail M (0.61 to 0. 81 L/acre)

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze the treated crop within 14 days of application or cut for hay within 42 days of application.

Preharvest Interval: DO NOT apply within 79 days of harvest.

Re-cropping: Winter wheat may be seeded 3 months after application. Barley, canary seed, canola (all varieties), corn, field peas, flax, lentils, oats, and spring wheat may be grown safely the year following application. Condiment mustard may be grown the second season following *Altitude FX/FX 2* application. Conduct a field bioassay the year before growing any other crop than those listed above.

Aerial Application: DO NOT apply by air.

Storage: DO NOT freeze. Store in a cool, dry place above 5°C. Combustible – DO NOT store near heat or open flame.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	11	11	11

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Starane

Danger – Poison

Warning – Eye Irritant

Caution – Skin Irritant

MCPA ester

Warning – Poison

For an explanation of the symbols used here see page 11.

Amitrol 240

Herbicide Group
11 - amitrole
(Refer to page 38)

Company:

Nufarm Agriculture (PCP#25684)

Formulation:

231 g/L amitrole formulated as a liquid.
Container size - 10 L.

Crops, Rates and Staging:

Fall Stubble: Perennial weed control prior to spring seeding. No planting restrictions for barley, canola*, field corn, field pea, soybean, wheat, or white bean, but leave 8 months between application and the seeding of any other crops.

Alfalfa stand renovation/removal: 4 to 6 inches (10 to 15 cm) high.

Pastures (spot treatment only): For non-selective patch treatment of dandelion, Canada thistle, perennial sow-thistle, hoary cress, milkweed, poison ivy and toadflax apply 0.165 L in 25 L of water to treat a 10 m x 10 m area. For treatment of leafy spurge and horsetail, apply 0.460 L in 25 L of water to treat a 10 m x 10 m area. DO NOT mow treated plants for 3 weeks after application.

Established shelterbelts: up to 11.3 L per acre - Keep spray away from tree foliage or trunks.

Pre-seeding:

CROP	RATE (L per acre)	Delay seeding after application
Barley, wheat, canola	1.7	0 to 1 days
Field pea	1.7	5 to 7 days
Soybean (low rate)	1.7	6 days
Soybean (high rates)	5.1 to 6.7	10 to 14 days
Field corn, white bean, soybean	3.3 to 6.7	10 to 14 days

Adhere to the maximum pre-seeding rates and delays between application and seeding indicated above to avoid the risk of damage to the emerging crop or excess residues in the grain.

Avoid using rates higher than 6.7 L per acre for preplant applications prior to soybeans, dry beans and corn on very light textured soils with low organic matter, as crop damage can occur.

Fallow areas: Apply according to weed stage and rates in the next section.

Weeds, Rates and Staging:

Fall stubble: Canada thistle, perennial sow-thistle - Spray when thistle has 4 to 6 inches (10 to 15 cm) of new growth. DO NOT cultivate for 2 weeks after application. DO NOT apply after October 1. DO NOT replant crops in treated areas within 8 months of application except those registered for pre-seeding uses.

Pre-seeding: Dandelion and annual weeds Apply 1.7 L per acre to actively growing weeds less than 10 cm tall or across. DO NOT cultivate for 10 to 14 days after treatment.

Fallow, Pastures and Shelterbelts:

WEED	RATE (L/ACRE)	WEED STAGE
Canada thistle	5.1 to 6.7	Early bud to bloom stage.
Cattails	15.2 to 18.5	After seed heads have formed.
Dandelion	1.7 to 5.1	Young and actively growing plants.
Hoary cress	7.6 to 11.3	Advanced rosette and bud stage.
Horsetail	5.0 to 6.7	Actively growing plants.
Leafy spurge	15.2 to 18.5	Advanced flowering to early seed set.
Milkweed	7.6 to 11.3	Early summer after majority of shoot emergence.
Perennial sow-thistle	5.1 to 6.7	Early bud to bloom stage.
Poison ivy	3.7	Fully developed green foliage.
Quackgrass	5.1 to 6.7	When plants are 4 to 6 inches (10 to 15 cm) high and actively growing.
Toadflax	7.6 to 11.3	Advanced rosette to prebud.

Application Information:

Water Volume:
Fall stubble: 20 to 81 L per acre.
Pastures, shelterbelts: 40 to 121 L per acre. For poison ivy, apply 202 to 405 L per acre.
Pre-seeding: 20 to 81 L per acre.

Nozzles and Pressure: Maximum 45 psi (less than 300 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressures designed to deliver proper coverage with *ASABE* **coarse** droplets.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Less than acceptable results may occur in dry weather.

Tank Mixes:

Nufarm also supports the following mixes that are not on the Amitrol 240 label. Mixes must be applied according to the most restrictive use limitations for either product:

Herbicides: glyphosate

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Re-entry: DO NOT re-enter treated areas for 12 hours.

Grazing: DO NOT graze treated crops or weeds or use for hay or feed.

Re-cropping: DO NOT plant any crop for 8 months following application except those registered for pre-seeding uses.

Aerial Application: DO NOT apply by air.

Storage: DO NOT store where temperatures may exceed 50°C or near open flames. Do not store below 4°C.

Buffer Zones: DO NOT contaminate any body of water. Use cautions to prevent spray, spray mist, or vapours from drifting off target. Spray drift may cause damage to crops or vegetation.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Caution – Poison

⚠ Warning – Eye Irritant

For an explanation of the symbols used here see page 11.

Ares

Herbicide Group
2 - imazamox & imazapyr
(Refer to page 38)

Company:

BASF Canada (PCP#30188)

Formulations:

33% imazamox and 15% imazapyr formulated as a solution.

Container size: 1x 9.8L jug, *Merge* 8.1 L jug.

Crops and Staging:

CLEARFIELD canola: 2 to 7 leaf stage.
CLEARFIELD oilseed mustard (*Brassica juncea*): 2 to 7 leaf stage.

Weeds, Rates and Staging:

At 244 mL per acre (40 acres per case), ***Ares*** **will control:**
Grasses - From 1 to 6 true leaf stage with up to 2 tillers stage:
Apply from 1 to 4 leaves, up to a maximum of two tillers.

Barnyard grass
Green foxtail
Japanese brome*
Persian darnel
Volunteer cereals
  (wheat NOT including CLEARFIELD varieties, durum, canaryseed, barley, oats)
Wild oats
Yellow foxtail

* Spring germinating Japanese brome at the 1 to 4 leaf stage.

Broadleaf Weeds - cotyledon to 4 leaf stage unless otherwise indicated:

- Cleavers (up to 4 whorls) ***
- Cow cockle
- Green smartweed
- Hemp-nettle
- Lamb's-quarters **
- Redroot pigweed
- Shepherd's-purse
- Stinkweed
- Volunteer canola (not CLEARFIELD varieties)
- Volunteer tame mustard (not CLEARFIELD oilseed varieties - B. juncea)
- Wild buckwheat**
- Wild mustard ***

** Cotyledon to 6 leaf stage.

*** NOT Group 2 resistant biotypes

Merge adjuvant must be used at a rate of 0.5 L per 100 L of spray solution.

DO NOT apply *Ares* more than once or follow *Ares* with any related product in the same year.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 20 to 40 L per acre.

Nozzles and Pressure: Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets. Use 50 mesh or coarser filter screens.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

DO NOT spray if temperatures of +5°C are forecast within 3 days of application. Treat crops during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced.

Tank Mixes:

Herbicides:

In CLEARFIELD canola only. DO NOT apply to CLEARFIELD oilseed mustard:

Lontrel 360 (84 mL/acre)

In CLEARFIELD canola and CLEARFIELD oilseed mustard:

Equinox (54 to 81 mL/acre)

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *Ares* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Avoid application when heavy rain is forecast.

Re-entry: DO NOT re-enter treated fields for 12 hours.

Preharvest Interval: DO NOT apply within 60 days of harvest of registered crops.

Re-cropping: Field peas, lentils, CLEARFIELD canola, canaryseed, oat, barley, field corn, chickpeas and spring wheat may be seeded the first full season after application. Flax, canola, durum wheat and sunflower may be seeded the second full season after application. The company recommends that a field bio-assay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool, dry place.

Environment: Avoid drift. Leave at least 11 m between the downwind edge of the boom and sensitive areas such as shelterbelts, hedgerows, wetlands, woodlots, vegetated ditch banks, ponds, streams, and sloughs.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

No specific hazards.

Assert 300 SC (2011)

See imazamethabenz on page 196.

Assert FL

Herbicide Group
2 - imazamethabenz & florasulam
4 - MCPA
(Refer to page 38)

This product is the equivalent of a prepackaged tankmix of *imazamethabenz* (page 196) and *Frontline XL* (page 172). Information listed is restricted to Crop, Weeds and Rates. For other detailed information on the component products see the product pages listed above.

Company:

Nufarm Agriculture

Formulation:

The *Assert FL* package has 3 components:

Assert (PCP#21032): 300 g/L imazamethabenz formulated as a suspension concentrate.

Container size - 13.5 L

Frontline A (PCP#27029): 50 g/L florasulam formulated as a suspension concentrate.

Container size - 0.8 L

Frontline B (PCP#27030): 500 g/L MCPA Ester formulated as an emulsifiable concentrate.

Container size - 5.6 L

pH adjuster 3.12 kg

Crops, Rates and Staging:

Spring wheat (including durum) and barley in the 2 to 6 leaf stage.

Weeds and Staging:

Weeds controlled by *imazamethabenz* and *Frontline* at the staging that is common to both component products.

Rates:

Assert: 0.65 L per acre;

Frontline A: 40 mL per acre;

Frontline B: 280 mL per acre.

One case treats 20 acres. Make only one application of this product or other product containing the same ingredients per year.

Restrictions:

Apply using application details that are common for both the component products and adhere to the most stringent restrictions of each.

Attain XC (2012)

See *Fluroxypyr + 2,4-D* on page 164.

Authority

Herbicide Group
14 - sulfentrazone
(Refer to page 38)

Company:

FMC Canada (PCP#29012)
Distributed by NuFarm Agriculture

Formulation:

480 g/L sulfentrazone formulated as a suspension concentrate.

Container sizes: 4 x 3.8L jugs per case.

Crops and Staging:

Chickpeas, Field Pea, Flax and Sunflower: Soil applied in the spring only.

Pre-plant surface: Apply to the soil surface prior to seeding the crop.

Pre-emergent surface: Apply to the soil surface up to 3 days after seeding. Crops emerging or near emerging at application may be injured.

All applications require rainfall for proper activation. (See "Effects of Growing Conditions")

DO NOT use on coarse soils classified as sand which have less than 1% organic matter or where water table is high.

Weeds and Staging:

Controls the following weeds when applied to the soil prior to emergence:

Kochia
Lamb's-quarters
Redroot pigweed
Wild buckwheat

Rates

Apply at 88 to 118 mL per acre (172 to 129 acres per case). Use the higher rates within the rate range for soils with pH less than 7.0 and organic matter greater than 3%.

DO NOT APPLY to coarse-textured (sandy) soils with organic matter less than 1%, compacted or heavy clay soils with less than 1.5% organic matter, soils with organic matter content greater than 6%, or to soils with a pH of 7.8 or greater.

Application of *Authority* in back to back years is not recommended.

Application Information:

Water Volume: Minimum 40 L per acre

Nozzles and Pressure: Maximum 30 psi (175 kPa) if using conventional nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver proper coverage with *ASABE medium* droplets or larger.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

All applications require rainfall for proper activation. If weed growth begins before activation occurs, poor control may result on larger weeds. A moderate rainfall (10 to 20 mm) or equivalent irrigation is required within 10 to 14 days to activate pre-emergent surface treatments. If rain does not occur, a shallow harrowing or use of a rotary hoe may assist activation using existing soil moisture. Dry conditions that persist after any application may reduce weed control. On sandy soils, heavy rainfall following application may cause leaching of *Authority*, resulting in reduced weed control.

Tank Mixes:

None registered.

Restrictions:

Rainfall: Rainfall following application is required for adequate weed control.

Grazing: DO NOT graze treated crops or cut for hay.

Preharvest Interval: Leave 60 days between application and harvest.

Re-entry: DO NOT re-enter treated area within 12 hours.

Re-cropping: Registered crops and soybeans may be planted anytime after application. Alfalfa, barley, field corn and spring, durum and winter wheat may be seeded the season following application (after one winter). Canola, sweet corn and sorghum may be seeded the second season (two winters) after application. Lentils may be seeded the third season following application (3 winters). For all other crops three winters must pass following application and a successful bioassay indicating adequate tolerance before planting. For each year of drought experienced, add one year to the intervals above and conduct a bioassay to confirm tolerance of the rotational crop. Lentils may be particularly sensitive to *Authority* residue.

Aerial Application: DO NOT apply by air.

Storage: Store above 5°C to keep from freezing. If frozen, and solid crystals are observed, warm to above 15 °C and shake or roll container periodically to dissolve solids.

Buffer Zones: DO NOT fill mix or clean sprayer within 15 m of any water source, unless the well is properly capped or activities take place on impervious pads or properly diked mixing/loading areas. Leave a 1m buffer between the last spray path and water or wetland habitats and 10 meters to sensitive plants and upland habitats when applying by ground. Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

Tank Cleaning:

After spraying and before using sprayer equipment for any other applications, thoroughly clean sprayer using the following procedure:

1. Drain sprayer tank, hoses, and spray boom. Use a high-pressure detergent wash to remove sediment and residues from the inside of the sprayer tank and thoroughly rinse. Then thoroughly flush all sprayer hoses, booms, and nozzles with clean water.
2. Prepare a sprayer cleaning solution by adding three litres of ammonia (containing at least 3% active) per 100 litres of clean water. Prepare sufficient cleaning solution to allow the operation of the spray system for a minimum of 15 minutes to thoroughly flush hoses, spray boom and spray nozzles.
3. Convenient and thorough cleaning of the sprayer can be achieved if the ammonia solution or fresh water is left in the spray tank, hoses, spray booms and spray nozzles overnight or during storage.
4. Drain the sprayer system. Rinse the tank with clean water and flush through the hoses, boom, and nozzles. Remove and clean spray tips and all strainers and screens separately in an ammonia solution.
5. Properly dispose of all cleaning solution and rinsate in accordance with provincial guidelines and regulations.

For additional information, Refer to page 15.

Hazard Rating:

☠ Caution – Poison.

For an explanation of the symbols used here see page 11.

Authority Charge

Herbicide Group
14 - carfentrazone & sulfentrazone
(Refer to page 38)

This product is a co-pack of *Aim* (page 78) and *Authority* (page 86). Information is restricted to Crop, Weeds, Rates and Tank Mixes. For other detailed information on the component products see the product pages listed above. *Note: this product is based on an unlabeled tank mix supported by the manufacturer.*

Company:

FMC Canada

Formulation:

Aim (PCP# 28573): 240 g/L cafentrazone formulated as an emulsifiable concentrate.
Container size – 1 x 1.2 L jug

Authority (PCP# 29012): 480 g/L sulfentrazone formulated as a suspension concentrate.
Container size – 2 x 3.79 L jug

Crops and Staging:

Chickpea, Field Pea, Flax and Sunflower:

Soil applied in the spring only, tank mixed with glyphosate.

Pre-plant surface: Apply to the soil surface prior to seeding the crop.

Weeds and Staging:

Weeds controlled by component products.

Rates

Aim: 15 to 18.75 mL per acre.

Authority: 88 to 118 mL per acre.

One case treats 80 to 64 acres at the respective rates above.

Tank Mixes:

Authority Charge should be tank mixed with glyphosate at 180 to 360 grams active ingredient per acre (0.5 to 1.0 L/acre of 360 g/L formulation See glyphosate page for equivalent rates for other formulations.) based on the *Aim* component label only. The *Authority* label does not list any registered tank mixes.

For additional information, precautions and restrictions see the individual component at the page numbers shown above.

Avadex Brands

Herbicide Group
8 - triallate
(Refer to page 38)

Company:

Gowan Canada

Formulation:

***Extra Strength Avadex BW* (PCP#16759):** 480 g/L triallate formulated as an emulsifiable concentrate.

Container size - 2x10 L to 1000 L.

***Avadex MicroActiv* (PCP#25112):** 10% triallate formulated as a granular. Container size - 22.7 kg, 451.3 kg.

Crops, Rates and Application Timing:

Avadex **Liquid Rates – Spring Treatment**

CROP	APPLICATION TIMING	RATE (L/acre)		ACRES TREATED PER 100 L CONTAINER	
		Organic Matter		Organic Matter	
		4% or less	Greater than 4%	4% or less	Greater than 4%
Spring and durum wheat	Before Seeding*	1.01	1.17	99	85.4
	After Seeding	1.17	1.41	85.4	70.9
Barley	Before and After Seeding	1.17	1.41	85.4	70.9
Canola, flax†, mustard	Before Seeding	1.41	1.86	70.9	53.7
Peas (dry)	Before Seeding	1.41	1.41	70.9	70.9

* Do not apply this product before seeding wheat in soils with 4 percent or less organic matter (brown, dark brown or grey wooded soils) where discers are to be used for seeding. If an air seeder is to be used, it must be equipped with a depth control device to ensure accurate seed placement, otherwise crop injury may occur.

† Excluding Solin (low linolenic acid flax).

Avadex **Granular Rates – Fall Treatment**

CROP	RATE (KG/ACRE)			ACRES TREATED PER 22.7 KG CONTAINER		
	Organic Matter			Organic Matter		
	Less than 2%*	2 to 4%	Greater than 4%	Less than 2%*	2 to 4%	Greater than 4%
Spring and durum wheat	4.45	5.67	6.88	5.1	4.0	3.3
Barley, canaryseed	4.45	5.67	6.88	5.1	4.0	3.3
Canola, flax†, mustard	5.67	6.88	8.90	4.0	3.3	2.6

* Fall treatments conducted under minimum tillage are not recommended on soils with less than 2 percent organic matter.

† Excluding Solin (low linolenic acid flax).

Avadex **Granular Rates – Spring Treatment**

CROP	APPLICATION TIMING**	RATE (KG/ACRE)		ACRES TREATED PER 22.7 KG CONTAINER	
		Organic Matter		Organic Matter	
		4% or less*	Greater than 4%	4% or less*	Greater than 4%
Spring and durum wheat	Before seeding***	4.45	5.67	5.1	4.0
	After seeding	5.67	6.88	4.0	3.3
Barley, canaryseed	Before and after seeding (barley only)	5.67	6.88	4.0	3.3
Canola, flax†, mustard	Before seeding	6.88	8.90	3.3	2.6

* Minimum tillage treatments must be applied to fields with at least 2 percent organic matter.

** Minimum tillage treatments must be applied 10 to 14 days before seeding or incorporating. For minimum tillage treatments on spring and durum wheat, apply 5.67 kg per acre on soils with 4% organic matter or less and 6.88 kg per acre on soils with greater than 4 percent organic matter.

*** Do not apply this product before seeding wheat in soils with 4% or less organic matter (brown, dark brown or grey wooded soils) where discers are to be used for seeding. If an air seeder is to be used, it must be equipped with a depth control device to ensure accurate seed placement, otherwise crop injury may occur.

† Excluding Solin (low linolenic acid flax).

Seedling Forage Legumes (under-seeded only):

Apply recommended rates for the companion crop.
Alfalfa
Bird's-foot trefoil
Clover (alsike, red, sweet)

Weeds and Staging:

For pre-emergent control of wild oats.

Application Information:

Water Volume (Liquid formulations only):
45 L per acre.

Pressure: 30 psi (200 kPa), liquid formulation only.

Nozzles: Flat fan, liquid formulation only. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE medium* droplets.

General Information: The liquid formulation must be incorporated into soil that is free of lumps or trash. The liquid formulation is recommended for spring use because soils are left in an erosion prone state if the liquid is fall-applied. The granular formulation may be incorporated into trashy soil and is best suited for fall use.

Fall Applications (Conventional Tillage): Apply *Avadex* granules to fields that are in good working condition, without excessive trash. Heavy trash or lumpy, wet fields may require tillage prior to application. *Avadex* must be applied after October 1 but before soil freeze-up. Application before October 1 may result in reduced weed control. Only one incorporation is required in the fall. The second incorporation may be done in the fall (before soil freeze-up) or in the spring.

Fall Application (Minimum Tillage): Applications of *Avadex* granules should be made to standing stubble, chemical fallow, or summerfallow fields that are not prone to erosion. DO NOT apply to smooth, hard packed soils that may allow granules to drift. If excessive crop residue exists at the time of application, harrowing should be conducted to ensure the granules are in good contact with the soil. Apply when the soil begins to cool (less than 4°C) and within 3 weeks of soil freeze-up. Incorporation can be performed in the spring before seeding or as part of the seeding operation.

Spring Application (Conventional Tillage): Apply *Avadex* (liquid or granules) to fields that are in good working condition, without excessive trash. Heavy trash or lumpy, wet fields may require tillage prior to application. Liquid formulations should be applied to fields with 30 percent or less trash cover. *Avadex* may be applied before or after seeding of wheat, barley, or canaryseed and before seeding of canola, flax, mustard or peas (liquid only). If wheat is being seeded into soils with an organic matter content of less than 4 percent, *Avadex* should be applied after seeding.

Spring Application (Minimum Tillage): *Avadex* granules should be applied in spring and when the soil temperature is 4°C or less. Apply granules 10 to 14 days before incorporation. DO NOT apply more than 4 weeks before seeding is intended.

Incorporation:

Conventional Tillage: Avadex applications require two incorporations, with the second incorporation at right angles to the first. Using a seeder that provides soil disturbance equivalent to a cultivator may replace one of the incorporations. The first incorporation of the granular formulation should be completed within 48 hours of application and the second incorporation should be delayed an additional 48 hours or more. The first incorporation of the liquid formulation should be completed as soon as possible after spraying, while the second incorporation may be done any time prior to crop emergence.

Incorporate to a depth of 2 inches (5 cm) by setting disc or cultivator implements to cut 3 inches (7.5 cm) into the soil. Mixing the product to greater depths will dilute the herbicide, decrease wild oat control, and may cause injury to cereals. Ensure that cereals are seeded below the treated layer (2 to 3 inches or 5 to 7.5 cm). Incorporations performed after seeding should be conducted with harrows or other suitable tillage equipment adjusted so as not to disturb the seed. Harrowing does not provide effective incorporation if compact soil prevents penetration of harrow teeth, if trash accumulates in the harrow sections, or if the harrows bounce.

Minimum Tillage: Incorporation of *Avadex* granules in minimum tillage systems is achieved with one high disturbance incorporation, which can be conducted prior to seeding, or as part of the seeding pass. A high disturbance system is one that disturbs the soil enough so that emerged weeds are controlled by the operation (example - air seeder with cultivator shovels). Harrowing after the incorporation operation is recommended for best results.

For optimum results in minimum tillage systems, incorporate when wild oat growth is noticeable in the field, as this will ensure that the soil is warm enough for activation of *Avadex*.

Under excessively warm or wet conditions between application and crop emergence, control may be reduced. For best results on heavy wild oat infestations, use the conventional tillage guidelines for incorporation.

Summer Fallow: Incorporation can be done by a disc followed by harrowing at right angles, a vibrashank cultivator followed by harrowing at right angles, or double harrowing. The second operation can be delayed until spring. If summerfallow must be ridged to prevent soil erosion the granular formulation should not be used in the fall. Note that fall minimum tillage applied granules do not require incorporation in the fall. If soils must be ridged following application of the liquid formulation, ridging depth should be kept to a minimum as deep ridging may reduce wild oat control and increase crop injury.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Reduced control may result if prolonged cool conditions or dry soil conditions prevail at the time weeds are emerging. If conditions are dry or wild oats germinate from below the treated zone, the weeds may emerge, but will usually be controlled. Thinning of wheat can occur under conditions of heavy rainfall or if cold soil conditions persist as the crop emerges.

Tank Mixes:

Herbicides: *Avadex* liquid may be tank mixed with liquid formulations of trifluralin for control of wild oats, green and yellow foxtail in wheat and barley. Apply after seeding but prior to crop emergence. Consult the recommendations for trifluralin for rates in different soil types.

Fertilizer: *Avadex* liquid alone, or tank mixed with liquid formulations of trifluralin, may be tank mixed with liquid fertilizer. Compatibility of the herbicide and liquid fertilizer should be checked. Follow the instructions on the herbicide label prior to adding the herbicide to the spray tank.

Avadex liquid may be sprayed on dry urea fertilizer. A minimum of 150 kg/ha (60 kg/acre) of dry urea fertilizer must be used. Only commercial blending is recommended.

Insecticides: None registered.

Note: The above mixes are those listed on the *Avadex* labels only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: At least 0.5 inches (1.5 cm) within 2 weeks of application is required for activation.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze the treated crop or use as hay or feed prior to crop maturity or in year of treatment.

Re-cropping: DO NOT seed tame oats the year after treatment.

Aerial Application: DO NOT apply by air (*Extra Strength Avadex BW*). Granular formulations may be applied by air with attachments designed for applying low volumes of granules (*Avadex MicroActiv*).

Storage: DO NOT freeze liquid formulations. Store granular formulations in a cool, dry place.

Buffer Zones: (Liquid formulations only)

Application method	Buffer Zones (metres †) Required for the Protection of:			
	Aquatic Habitats of Depths			Terrestrial habitat
	Less than 1 m	1 to 3 m	Greater than 3 m	
Ground only*	5	2	1	5

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Warning – Poison (Liquid formulation)

⚠ Warning – Contains the allergen soy (Liquid and Granular)

Skin and Eye Irritant (Granular formulation)

For an explanation of the symbols used here see page 11.

Avenge 200 C

Herbicide Group
8 - difenzoquat
(Refer to page 38)

Company:

AmVac Corporation, distributed by Syngenta
(PCP#12853)

Formulation:

200 g/L difenzoquat formulated as a solution.
Container size - 2 x 10 L, 113 L.

Crops and Staging:

Apply up the 6 leaf stage of cereal and grass crops:
Barley
Canaryseed
Fall rye (Cougar, Frontier, Kodiak, Puma, Rymin only)
Triticale (Carman and Welsh)
Wheat (AC Barrie, Biggar, Bluesky, CDC Makwa, CDC Teal, Columbus, Conway, Cutler, Fielder, Genesis, Glenlea, Katepwa, Lancer, Leader, Neepawa, Oslo, Pasqua, Selkirk and Wildcat wheat varieties).
Winter wheat (Norstar only)

Forages* (only when underseeded to wheat and barley varieties listed above):
Alfalfa
Bird's-foot trefoil
Bromegrass
Creeping red fescue
Crested wheatgrass
Kentucky bluegrass
Meadow fescue
Orchardgrass
Red clover
Reed canarygrass
Russian wildrye
Sweet clover
Timothy

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Seedling grasses* (apply up to the 3 leaf stage of wild oat):
Meadow bromegrass
Meadow foxtail
Pubescent wheatgrass
Streambank wheatgrass
Tall fescue
Tall wheatgrass

* Grasses may show damage in year of application but will recover the following year.

Weeds and Staging:

Wild oats at the 3 to 5 leaf stage.

Rate:

Apply 1.42 to 1.72 L per acre. Use the higher rate if wild oat population exceeds 200 wild oats per square metre.

One 20 L container treats 14 to 11 acres.

Application Information:

Water Volume:
Ground application: 40 L per acre.
Aerial application: 8 to 20 L per acre

Nozzles and Pressure: Maximum 40 psi (275 kPa) when using conventional flat fan nozzles directed 45° forward. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Crop injury is worse on cold or hot, humid days than when temperatures are moderate. Best weed control is attained when temperatures are 20 to 30°C, particularly when these temperatures follow application. Do not spray when crop or weeds are wet with heavy dew or rain. Do not apply when crop is under stress from drought, excessive moisture, or heat.

Tank Mixes:

Herbicides:

In wheat and barley:
2,4-D ester (up to 0.45 L/acre of 500 g/L formulation). DO NOT use amine formulations.
2,4-DB (see 2,4-DB section for rates). May be used on cereals underseeded to forages.
Ally (2 to 3 g/acre)*
Bromoxynil/MCPA (recommended rates)
Curtail M (0.8 L/acre)
Dichlorprop/2,4-D (0.71 L/acre)
MCPA ester (up to 0.36 L/acre of 600 g/L formulation). DO NOT use amine formulations.
Pardner (0.4 to 0.48 L/acre)
Thumper (0.4 L/acre)

In canaryseed:

Bromoxynil/MCPA (Buctril M, Brotex)(label rates)
MCPA ester (0.32 to 0.36 L/acre of 600 g/L formulation)
Pardner (0.4 L/acre)
*No additional adjuvant required.

Insecticides: None registered

Fertilizers: None registered.

Fungicides: None registered.

Allow a 5-day interval between the application of *Avenge* and other pesticides.

Note: The above mixes are those listed on the *Avenge* label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Syngenta also supports the following mixes that are not on the *Avenge* label. Mixes must be applied according to the most restrictive use limitations for either product:

Herbicides: *Attain XC; Broadside; Frontline XL; Infinity; OcTTain XL; Prestige XC; Refine SG; Refine SG + MCPA Ester; Retain; Spectrum; Triton C.*

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 6 hours of application will reduce control.

Re-entry: DO NOT enter treated fields for at least 48 hours.

Grazing: DO NOT graze or feed treated cereal crop for 8 weeks after treatment. Do not graze or feed treated forages in the year of treatment. Straw from treated fields can be fed to livestock 8 weeks after application.

Preharvest Interval: DO NOT apply beyond the recommended crop stage.

Re-cropping: No restrictions the year after treatment.

Aerial Application: May be applied by air.

Storage: May be frozen.

Buffer Zones: DO NOT contaminate water bodies (sloughs, dugouts, lakes, streams, ponds, etc.).

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Warning – Poison

For an explanation of the symbols used here see page 11.

Axial*/Axial BIA

Herbicide Group
1 - pinoxaden
(Refer to page 38)

Company:

Syngenta Canada

Formulation:

***Axial* (PCP#28150)*:** 100 g/L pinoxaden formulated as an emulsifiable concentrate.
Container size - 9.7 L or 77.6 L container.

***Adigor* Adjuvant (PCP#28151)*:** 11.3 L or 90.4 L container.

-or-

***Axial BIA* (PCP#30341):** 50 g/L pinoxaden formulated as an emulsifiable concentrate.
Container size - 2x10 L, 80 L, 400 L.

** Note: This formulation is no longer manufactured, but some supplies may still remain in the distribution system. This product may be removed from future editions of this publication.*

Crops and Staging:

Spring wheat (not including durum), and barley. Up to the emergence of the flag leaf.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds, Rates, and Staging:

Apply from the 1 to 6 leaf up to the emergence of the 4th tiller.

***Axial* at 0.24 L/acre* plus *Adigor* adjuvant at 0.28 L per acre or *Axial BIA* at 0.48 L per acre (no adjuvant required)* (one case treats 40 acres):**

Foxtail (green and yellow)
Barnyard grass
Proso millet
Volunteer oat
Volunteer canary seed
Wild oat

Apply at the 2 to 3 leaf stage for optimum control.

Optimum weed control and yield response occurs when weeds are controlled before tillering.

***Maximum one application per year of this or other products containing the active ingredient pinoxaden. Do not mix with any other adjuvant other than what is provided in the package.**

Application Information:

Water Volume:

Ground: 20 to 40 L per acre.

Aerial: 12 L per acre

Nozzles and Pressure: 40 to 45 psi (275 to 310 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE medium*** droplets. Use a 50 mesh or coarser screen and filter system.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

DO NOT apply to crops that are stressed (frost, low fertility, drought or flooding, disease or insect damage) as crop injury may result.

Weed control may be reduced if *Axial* is applied under stress conditions such as drought, heat, insufficient fertility, flooding or prolonged cool temperatures.

Tank Mixes:

Herbicides:

Tank-mix Partner[*]	**Product Rates**
Buctril M[†]	0.4 L/acre
Curtail M[†]	0.6 to 0.81 L/acre
Frontline XL	0.5 L/acre
Infinity	0.33 L/acre
MCPA ester[†]	0.34 to 0.44 L/acre (500 formulation)
Mextrol 450M[†]	0.5 L/acre
Refine SG[**]	12 g/acre
Refine SG[**] + *MCPA ester*[***†]	12 g/acre + (0.23 to 0.28 L/acre)
Spectrum[***†]	20 acres per case
Stellar	40 acres per case
Trophy[†]	20 acres per case

* Always consult the label of the broadleaf herbicide prior to use.

** Addition of surfactants other than those provided with *Axial* or *Axial BIA* are not required.

*** Suppression only of green foxtail.

† A reduction in barnyard grass control may be observed.

Insecticides: None registered.

Fungicides: *Tilt* (label rates).

Fertilizers: None registered.

Note: The above mixes are those listed on the *Axial* label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Syngenta also supports the following mixes that are not on the *Axial* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides: *Barricade; Broadside; Prestige XC; Pulsar; Pulsar (low rate)+MCPA ester; Stellar; Triton C; Triton C + MCPA*[††]

Fungicides: *Propel*

†† Only wild oat is controlled with Axial.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 1 hour of treatment may reduce control.

Re-entry: DO NOT enter treated fields for 12 hours.

Preharvest: Leave at least 60 days between treatment and harvest of grain and straw.

Grazing: DO NOT graze livestock within 7 days or cut for hay within 30 days of application.

Re-cropping: No restrictions the year following treatment. DO NOT seed any crops in the year of treatment following application (emergency re-crop).

Aerial Application: May be applied by air.

Storage: Store in a cool, dry place. May be frozen.

Buffer Zones:

Application method	Buffer Zones (metres[†]) Required for the Protection of: Terrestrial habitat
Ground only[*]	1
Aerial by airplane or helicopter	25

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Buffers are not required for handheld and backpack applications.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Caution – Poison

◇ Warning – Eye and skin irritant

For an explanation of the symbols used here see page 11.

Axial iPak

Herbicide Group

1 - pinoxaden
6 - bromoxynil
27 - pyrasulfotole
(Refer to page 38)

This product is a prepackaged tank mix of *Axial* (page 93) and *Infinity* (page 200). Information listed is restricted to Crop, Weeds and Rates. For other detailed information on the component products see the product pages listed above.

Company:

Syngenta Canada

Formulation:

The Axial iPak package may contain either:

Axial **(PCP#28150)*:** 100 g/L pinoxaden formulated as an emulsifiable concentrate.
Container size - 1 x 4.85 L jug.

-and-

Adigor Adjuvant **(PCP#28151):** 1 x 5.65 L jug.

-or-

Axial BIA **(PCP#30341):** 50 g/L pinoxaden formulated as an emulsifiable concentrate.
Container Size - 1x10L

-plus-

Both versions contain:

Infinity **(PCP#28738):** 37.5 g/L pyrasulfotole and 210 g/L bromoxynil formulated as an emulsifiable concentrate.
Container size - 1 x 6.7 L jugs per case.

** NOTE: this formulation is no longer manufactured, but some supplies may still remain in the distribution system. This product may be removed from future editions of this publication.*

Crops and Staging:

Spring wheat (not including durum), and barley. Up to the emergence of the flag leaf.

Weeds and Staging:

Weeds controlled by the component products.

Rates:

Axial: 0.24 L per acre*

-plus-

Adigor adjuvant: 0.28 L per acre (add last)

-or-

Axial BIA: 0.48 L per acre (no adjuvant required)*

-plus-

Infinity: 0.33 L per acre.

One case treats 20 acres

Note: Ammonium sulphate is required to be added at 202 g per acre (99% dry) or 0.4 L per acre (49% solution) at 4 to 6 whorls for certain weeds controlled by *Infinity*

* Maximum one application of either product per year of this or other products containing the active ingredients pinoxaden, pyrasulfotole or bromoxynil. DO NOT mix with any other adjuvant other than what is provided in the package.

For additional information, precautions and restrictions, see the individual component at the page numbers shown above

Axial Xtreme

Herbicide Group
1 - pinoxaden
4 - fluroxypyr
(Refer to page 38)

Company:

Syngenta (PCP#30391)

Formulation:

50 g/L pinoxaden and 87.5 g/L fluroxypyr formulated as an emulsifiable concentrate.

Container size: 2x 10L, 80 L.

Crops and Staging:

Spring wheat (NOT including durum) and barley:

1 to 6 leaf stage prior to the emergence of the 4th tiller, and before the first node can be felt in the stem.

Weeds and Staging:

Grasses - 1 to 6 leaf prior to the emergence of the 4th tiller

Foxtail (green and yellow)
Barnyard grass
Proso millet
Volunteer oat
Volunteer canary seed
Wild oat

Broadleaf Weeds - stages indicated below:

Cleavers (up to 4 whorls)
Kochia (2 to 8 leaf)
Stork's bill (up to 6 leaf)*
Wild buckwheat (up to 4 leaf)*

* Suppression.

Rates:

0.48 L per acre.
(40 acres per case)

DO NOT apply *Axial Xtreme* more than once or follow it with any other products containing pinoxaden or fluroxypyr in the same year.

Application Information:

Water Volume: 20 to 40 L per acre.

Nozzles and Pressure: Maximum 40 to 45 psi (275 to 310 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE coarse classification*** droplets. Use 50 mesh or coarser filter screens. Thorough coverage of the plants is essential for consistent control.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Tolerance and efficacy is best when applied during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under prolonged stress caused by excessive cool or heat, flooding or drought, or poor fertility, control of some weeds may be reduced and or crops may be injured.

Tank Mixes:

Herbicides:
Bromoxynil/MCPA (label rates) †
Curtail M (0.61 to 0.81 L/acre) †
Frontline XL (0.5 L/acre) ††
Infinity (336 mL/acre) ††
MCPA ester (0.28 to 0.37 L/acre – 600 g/L form) †
Refine SG (12 g/acre)
Refine SG + MCPA ester (rates above) †

† A reduction in barnyard grass control may be observed with this mix.

†† A reduction in green foxtail control may be observed with this mix.

Fungicides: *Tilt* (101 to 202 mL/acre)

Insecticides: None registered.

Fertilizers: None registered.

Note: The above mixes are those listed on the *Axial Xtreme* label only. To check for other possible mixes see the blue fold out chart in the back inside cover of the guide.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 1 hour of application may reduce control.

Re-entry: DO NOT re-enter treated fields for 12 hours.

Preharvest: DO NOT apply within 60 days of harvest.

Grazing: Must not be grazed within 7 days or cut for livestock feed within 30 days of treatment.

Re-cropping: Barley, canola, flax, forage grasses, lentils, mustard, oats, peas, rye or wheat may be seeded the first full season after application or fields can be summerfallowed.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool, dry place. DO NOT freeze.

Environment: Avoid drift. Leave at least 15 m between the downwind edge of the boom and sensitive areas such as shelterbelts, hedgerows, wetlands, woodlots, vegetated ditch banks, ponds, streams, and sloughs. Buffer zones can be reduced by 70% when using shrouds or by 30% when using cones mounted less than 12 inches from the crop canopy.

Tank Cleaning:

Refer to 'Method B' on page 15. Use 500 g or mL per 100L of rinsate for alkali detergents or 250 g or mL per 100L of rinsate for concentrated laundry detergents. DO NOT use chlorine based cleaners.

Hazard Rating:

◇ Warning – Eye and skin irritant

Potential skin sensitizer.

For an explanation of the symbols used here see page 11.

Barricade*/Barricade II

Barricade **is a tank mix of** ***Barricade SG*** **with fluroxypyr** ***(Perimeter** or** ***Perimeter II).***

Herbicide Group
2 - thifensulfuron & tribenuron
4 - fluroxypyr
(Refer to page 38)

Company:

E. I. duPont Canada

Formulation:

The *Barricade*/Barricade II* package contains two components:

Barricade SG **(PCP=29544):** 25% thifensulfuron methyl plus 25% tribenuron methyl formulated as a water soluble granule.

Container size - 486 g bottle.

-plus either-

Perimeter **(PCP=29586)*:** 180 g/L fluroxypyr formulated as an emulsifiable concentrate.

Container size - 6.48 L.

-or-

Perimeter II **(PCP=30094):** 333 g a.e./L fluroxypyr formulated as an emulsifiable concentrate.

Container size - 3.4 L

* *NOTE: this formulation is no longer manufactured, but some supplies may still remain in the distribution system. This product may be removed from future editions of this publication.*

Crops and Staging:

Barley and spring wheat (including durum) from 2 leaf until first node can be felt at the base of the stem.

DO NOT use on Ledger barley or Belvedere wheat.

Weeds and Staging:

Unless otherwise noted below, apply to young and actively growing weeds that are less than 4 inches (10 cm) in height or width.

Weeds Controlled:

Annual smartweed (green smartweed, lady's-thumb)
Canada thistle (less than 6 inches (15 cm) tall or across and prior to budding)**
Cleavers (1 to 4 whorls)
Common chickweed (1 to 6 leaf)
Cow cockle
Flixweed
Hemp-nettle
Kochia†
Lamb's-quarters
Night-flowering catchfly
Narrow-leaved hawk's beard
Redroot pigweed
Russian thistle**
Stinkweed
Stork's-bill (1 to 6 leaf)
Volunteer canola (not CLEARFIELD varieties)
Wild buckwheat
Wild mustard
Volunteer flax (up to 12 cm)

** Suppression only.

† *NOTE: Surveys of fields with kochia have found that roughly 90% of these kochia populations were resistant to Group 2 herbicides. Without testing that confirms otherwise, assume that kochia in your field is likely resistant as well and is unlikely to be controlled by thifensulfuron/tribenuron alone.*

Rate:

Barricade SG: 12 g per acre.

-plus either-

Perimeter: 160 mL per acre.

-or-

Perimeter II: 85 mL per acre.

(one package treats 40 acres)

Maximum of one application of this or other thifensulfuron/tribenuron products or fluroxypyr products per year.

Add *Agral 90, Agsurf,* or *Citowett Plus* at 0.2 L per 100 L of spray solution. *Barricade SG* may degrade if left in the sprayer for an extended period. Apply within 24 hours of mixing.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: Minimum 40 L per acre.

Nozzles and Pressure: Flat fan nozzles are recommended. Sprayers without drift reduction nozzles should use between 30 to 40 psi (210 to 275 kPa). Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE medium*** droplets. Use a 50 mesh or coarser screen and filter system.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

DO NOT apply to registered crops that are stressed by severe weather conditions (frost, drought or water saturated soil) as crop injury may result. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after application may reduce weed control and crop tolerance. Under certain conditions (heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures) lightening in crop colour and reduction in crop height may occur.

Tank Mixes:

Herbicides: None registered

Fertilizers: None registered.

Note: The above mixes are those on the *Barricade / Barricade II* labels only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

E.I. duPont also supports the following mixes that are not on the *Barricade* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides: *Horizon (240 EC & NG), Axial, Flucarbazone + 2,4-D Ester, MCPA ester* (190 mL/acre), *Puma*^{120} *Super, Puma Advance, Simplicity.*

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Up to 1 inch within 1 hour of application may reduce control.

Re-entry: DO NOT re-enter treated fields for 12 hours.

Preharvest Interval: Leave 60 days between application and harvest.

Grazing: MUST NOT be grazed or fed to livestock for 7 days after treatment.

Re-cropping: Barley, canola, flax, forage grasses, lentils, mustard, oats, peas, rye or wheat or fields can be summerfallowed the year after treatment.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool, dry place. Avoid freezing. If frozen, bring to room temperature and agitate before use. This product is COMBUSTIBLE. DO NOT store near heat or open flame.

Buffer Zones:

Application method	Buffer Zones (metres †) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground*	15	15	15

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

Tank Cleaning:

Follow the tank cleaning instructions on the *thifensulfuron/tribenuron* page. The addition of a wetting agent (detergent) will also aid the cleaning process.

Refer to page 14 for additional information.

Hazard Rating:

☠ Danger – Poison

⚠ Warning – Contains the allergens milk and sulfites

For an explanation of the symbols used here see page 11.

Basagran Brands

Herbicide Group
6 - bentazon
(Refer to page 38)

Company:

BASF Canada
Basagran (PCP#12221)
Basagran Forté (PCP#22006)

Formulation:

480 g/L bentazon formulated as a solution in both products. *Basagran Forté* has a built-in adjuvant.

Container size -
Basagran: 2 x 9 L jugs.
Basagran Forté: 2 x 10 L jugs.

Crops and Staging:

***Basagran* and *Basagran Forté*:**

CROP	STAGE
Soybeans	No restrictions
Dry beans ***	After the first trifoliate leaf
Corn	No restrictions
Peas	After 3 leaf pairs but prior to flowering
Fababeans	At least 4 inches (10 cm) tall
Flax	After 2 inches (5 cm) in height

***Basagran Forté* only:**

CROP	STAGE
Forage millets and forage sorghum (forage and seed production)*	3 to 6 leaf prior to canopy closure

***Basagran* only:**

CROP	STAGE
Spring wheat (excluding durum)**	No restrictions (limited to the 4 leaf to flag leaf by 2,4-D staging)
Solin	After 2 inches (5 cm) in height
Forage grasses for seed production*: Bromegrass, creeping red fescue, crested wheatgrass, meadow foxtail, orchardgrass, timothy.	1 to 7 leaf stage
Forage legumes (seedlings) for seed production*: Alfalfa, alsike clover, red clover, sainfoin.	After the third trifoliate leaf
Established alfalfa for seed production.	Prior to flowering
Established clover (Sweet, or Red) and sainfoin for seed production.	3 to 10 inches (7.5 to 25 cm) high

* One application per season.

** *Basagran* only at 0.4 L per acre. Must be tank mixed with 2,4-D (no adjuvant required).

*** Refer to product labels for a list of dry bean types registered for *Basagran*. *Basagran Forté* register for all dry bean types but not tested for tolerance on all types. Test a small area of new varieties for tolerance before widespread use.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds, Rates and Staging:

Add *Assist* or *XA* oil concentrate at 0.41 to 0.81 L per acre to *Basagran* only. *Basagran Forté* does not require the addition of *Assist* or *XA* oil concentrate. If hot, humid conditions prevail (above 28°C and 80% relative humidity), use only the low rate of *Assist* or *XA* oil concentrate. *Citowett Plus* may be used on peas at 0.25 L per 100 L spray mixture. Apply the rate listed when weeds in the table are within the recommended height:

ANNUAL WEEDS	**0.71 L per acre**		**0.91 L per acre**	
	Inches	**Maximum Leaf Stage**	**Inches**	**Maximum Leaf Stage**
Buttercup			2 to 4	6*
Cleavers			1 to 3 whorl stage	
Cocklebur	3 to 7	6*	7 to 12	10*
Common chickweed			1 to 3 weeks after emergence	
Common groundsel			2 to 4	
Common ragweed			1 to 2	6
Corn spurry			1 to 4	
Flower of an hour	1 to 2	6*	2 to 4	10*
Giant ragweed			2 to 6	4
Hairy galinsoga			2 to 3	6*
Hairy nightshade			0.2 to 0.8	6
Lady's-thumb (smartweed)	1 to 3	6*	3 to 8	10
Lamb's-quarters			0.5 to 1.0	8
Purslane			1 to 2	6
Redroot pigweed (suppression only)			0.5 to 1.5	4
Russian thistle (suppression only*)			1 to 3	4*
Shepherd's-purse	Rosette to 4	6*	4 to 10	6
Stinkweed	Rosette to 2	6*	2 to 6	6
Stork's-bill			1.5 to 4	2 to 6 leaf stage
Volunteer canola	0.75 to 6	8**	0.75 to 6	8
Wild mustard	1 to 5	6*	5 to 10	10
Wild radish			1 to 2	6
PERENNIAL WEEDS	Repeat application 7 to 15 days after first application (if necessary)			
Canada thistle	6 to 8			
Field bindweed	1 to 2.5			
Yellow nutsedge	6 to 8			

*Applies to *Basagran Forté* only.

**Applies to *Basagran* only.

Basagran may be applied in wheat at 0.4 L per acre when tank mixed with *2,4-D* amine or ester (500 g per L) at 0.3 to 0.4 L per acre to control the weeds controlled by *2,4-D* plus lady's-thumb, redroot pigweed and daisy fleabane. No adjuvant is required for this mix.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 40 to 160 L per acre. A minimum of 80 L per acre is recommended for optimum control.*

Nozzles and Pressure: Maintain 40 to 60 psi (275 to 425 kPa)* when using conventional flat fan nozzles capable of delivering high water volumes with ***ASABE medium*** droplets. Low drift nozzles may require higher pressures for proper performance. Contact the herbicide manufacturer regarding the suitability of low drift nozzles for use with this product. Direct nozzles 45° forward to improve contact with vertical targets.

* Higher water volumes and pressures should be used when the weeds are at the upper end of their recommended treatment stage.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Poor results will occur if temperatures are cool. Optimum results are achieved when applied at daytime temperatures between 20 and 28°C. Applications at temperatures greater than 28°C may result in crop injury.

Tank Mixes:

Herbicides:

In soybeans:

Pinnacle (2.2 to 3.2 g/acre)

In dry beans:

* *Basagran* only (0.71 L/acre) plus *Reflex* (0.23 L/acre) plus *Agral 90*.

Basagran Forte (0.5L/acre) plus *Solo* (11.7 g/acre + *UAN liquid 28-0-0* (0.8 L/acre). Failure to add the 28-0-0 could result in weed escapes.

In cranberry dry beans and black dry beans

Basagran Forté only at 0.7 to 0.91 L/acre can be tank mixed with *Pinnacle* at 3.2 g/acre.

In spring wheat *(not including durum):*

Basagran only at 0.4 L/acre can be tank mixed with *2,4-D amine* or *ester* (500 g/L) at 0.3 to 0.4 L/acre. This tank mix DOES NOT need any adjuvant.

* For use in the Red River Valley of Manitoba only.

Fertilizers: Use of fertilizer mixes is not recommended for use under western Canadian environmental conditions for most crops. Ammonium sulphate may be added to a *Basagran* spray solution at a rate of 1.5% v/v to improve weed control consistency in dry beans (pinto, great northern, pink and small reds). The risk of bean injury increases with this mixture under hot humid conditions. Use with *Assist Oil Concentrate*. Not for use with *Basagran Forté*.

Insecticides: None registered.

Fungicides: None registered.

When mixing *Basagran Liquid* or *Basagran Forté* refer to the tank mix partner label for any additional restrictions and precautions.

Allow 4 days between application of *Basagran* and other herbicides, fertilizers or insecticides.

Note: The above mixes are those listed on the *Basagran/ Basagran Forté* labels only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 6 to 8 hours will reduce control.

Re-Entry: DO NOT enter treated field for 12 hours.

Grazing: Allow 30 days between treatment with *Basagran Forté* and harvest of forage sorghum and millet for hay. Otherwise DO NOT graze treated crops or cut for feed prior to crop maturity.

Preharvest Interval: 50 days for *Basagran + 2,4-D* in wheat, 84 days for *Basagran + Reflex* in Dry beans in Manitoba. Other uses are restricted only by appropriate staging.

Re-cropping: No restrictions the year after application.

Aerial Application: May be applied by air for weed control in dry beans or soybeans only. Use 23 to 45 L/acre water volume. *Assist* or *XA Oil Concentrate* at 0.05 to 0.1 L/acre must be added. DO NOT use *Assist* or *XA Oil Concentrate* in excess of 0.1 L/acre as substantial crop injury could occur. DO NOT apply fertilizer mixes in soybean or *2,4-D* tank mix in wheat by air. Crop canopy should NOT cover the weeds.

Storage: May be frozen.

Buffer Zones:

Application method	Crop	Buffer Zones (metres††) Required for the Protection of: Terrestrial habitat
Ground†	Sorghum**, Forage millet**, Forage grasses and legumes*, Peas*	1
	Corn, Dry beans, Fababeans, Flax, Peas**, Soybeans, Spring wheat*	2
Fixed wing airplane*	Dry bean	20
	soybean	35
Helicopter*	Dry bean	20
	soybean	30

See the key to product pages on page 27 for an explanation of the different habitats.

* *Basagran* only

** *Basagran Forté* only

† Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

†† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Basagran

Caution – Poison

Basagran Forté

Warning – Poison

Danger – Corrosive to Eyes

Warning – contains the allergen soy.

For an explanation of the symbols used here see page 11.

Battalion*

*** (For use only on field corn grown in the Red River Valley region of Manitoba)**

Herbicide Group

2 - rimsulfuron

4 - dicamba

15 - metolachlor

(Refer to page 38)

Company:

E.I duPont Canada

Formulation:

The *Battalion* package contains the following:

***Elim EP* (PCP#23518):** 25% rimsulfuron formulated as a water dispersible granule.

Container sizes: 480 grams (8 x 60 gram soluble bags).

***Dual II Magnum* (PCP#25729):** 915 g/L s-metolachlor formulated as an emulsifiable concentrate.

Container sizes: 6 L.

***Banvel II* (PCP#23957):** 480 g/L dicamba formulated as a solution of a diglycolamine salt.

Container sizes: 6 L.

Crops and Staging:*

May be applied to field corn as a pre-emergent or post-emergent application. For use in the Red River Valley region of Manitoba only. DO NOT use on sweet corn.

Pre-emergent – apply as a broadcast ground treatment after planting but before weeds and corn emerge.

Post-emergent – apply up to the 3-leaf stage (2 visible collars or 20 cm in height – leaf extended). Corn hybrid sensitivity to post-emergent applications of *Battalion* have been observed in the field with varieties rated less than 2500 CHU in regions with less than 2500 CHU. Refer to the Corn Hybrid Sensitivity section of the *Battalion* label for complete details.

* *NOTE - Since applications to Corn in the Red River Valley region of Manitoba has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance or crop safety.* ***Application to corn is at the risk of the user.***

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Weeds and Staging:

Pre-emergent applications:**

Common ragweed
Eastern black nightshade
Green foxtail
Lady's-thumb
Lamb's-quarters
Quackgrass (suppression)
Redroot pigweed
Yellow foxtail (suppression)

** Rain is required within 10 days of application or a shallow cultivation or use of a rotary hoe is required.

Post-emergent applications: Apply prior to the 2 leaf stage of the following weeds. *Battalion* must be applied with a non-ionic surfactant (see **'Rates'** for details)

Annual smart weeds
(green, lady's thumb)
Barnyard grass
Cleavers
Common ragweed
Corn spurry
Cow cockle
Eastern black nightshade
False ragweed
Foxtail (Green and Yellow)
Giant ragweed
Hare's-ear mustard
Indian mustard
Lamb's-quarters
Quackgrass (suppression)
Redroot pigweed
Russian pigweed
Tartary buckwheat
Tumble mustard
Velvetleaf
Wild buckwheat
Wild mustard
Wormseed mustard

Rates:

	Rate per acre	
	Application timing	
Component	Pre-emergent	Post-emergent
Elim EP	24 g	20 g
Dual II Magnum	300 mL	250 mL
Banvel II	300 mL	250 mL
Acres per case	20	24

* *Battalion* must be applied with a non-ionic surfactant such as *Citowett Plus, Agral 90* or *Agsurf* at a rate of 0.2 L per 100 L of spray solution (0.2 % v/v) when applied as a post emergent application to corn.

Application Information:

Water Volume: 60 to 70 L per acre.

Nozzles and Pressure: Flat fan nozzles are recommended. Sprayers without drift reduction nozzles should use a maximum of 40 psi (275 kPa). Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE* medium** droplets. Use a 50 mesh or coarser screen and filter system

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Rapid fluctuations in temperature (greater than 20ºC difference within 24 to 36 hours) will stress the corn crop. For maximum crop safety, allow 48 to 72 hours for the corn to acclimatize before applying *Battalion*.

Apply ONLY when the temperature in the 24 hours before AND after application is between 10ºC and 25ºC. Temperatures beyond this range increase the potential for crop injury. Separate applications of *Battalion* herbicide followed by a broadleaf herbicide (minimum of 12 hours later) will reduce the potential for injury.

WARNING: Crop injury may result if application is made to corn that has been stressed by abnormally hot, humid, or cold weather conditions, frost, low fertility, drought, water saturated soil, compacted soil, previous pesticide applications, disease, or insect damage. If corn has been injured by frost, wait 48 to 72 hours before applying *Battalion*.

Tank Mixes: None registered

NOTE: *Battalion* should **NOT** be applied to corn that has been treated with *Thimet, Lorsban* or *DiSyston* insecticides. Leave 7 days between the application of Battalion and that of a foliar organophosphate insecticide.

Note: The above mixes are those listed on the *Battalion* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. See the general guidelines for mixing pesticides for more information.

Restrictions:

Rainfall:

Pre-emergent applications: Rainfall is required within 10 days of application for proper activation of *Battalion*. Otherwise a shallow cultivation or use of a rotary hoe is required.

Post-emergent applications: Within 4 hours of application may result in reduced weed control.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze treated crops or cut for feed.

Preharvest Interval: Leave at least 80 days from application to harvest.

Re-cropping: Corn, winter wheat and barley may be seeded the year following *Battalion* application. For all other crops, a field bioassay is recommended before planting.

Aerial Application: DO NOT apply by air.

Storage: May be frozen.

Buffer Zones:

Application method	Buffer Zones (metres[†]) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	5

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

[†] Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

DO NOT mix or load within 30 m of any water sources.

Tank Cleaning:

Refer to product label for complete tank cleaning instructions. DO NOT clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

For additional information, Refer to page 15.

Hazard Rating:

☠ Caution – Poison (Banvel II)

◇ Warning – Eye Irritant

Keep out of reach of children

For an explanation of the symbols used here see page 11.

Blazer

Herbicide Group
14 - acifluorfen
(Refer to page 38)

Company:

United Phosphorus Inc. (PCP# 23315)

Formulation:

240 g / L acifluorfen present as a sodium salt and formulated as a solution.

Container size - 10 L jug.

Crops and Staging:

Soybean from the 1 to 3 trifoliolate leaf stage.

DO NOT apply before the first trifoliolate leaf stage of the soybean.

DO NOT apply to soybeans grown on sand or loamy sand soils.

Weeds and Staging:

***Blazer* applied at 0.5 L per acre (one jug treats 20 acres) plus *Assist* adjuvant at 0.5 L per 100 L of spray solution will control:**

WEED	MAXIMUM LEAF STAGE
Common ragweed	8
Redroot pigweed	4

***Blazer* applied at 1.0 L per acre** (one jug treats 10 acres) will control the weeds above plus the following weeds at the maximum leaf stages listed:**

WEED	MAXIMUM STAGE
Canada thistle*	Pre-bud
Cocklebur	4 leaf
Common milkweed*	-
Field bindweed*	-
Hedge bindweed*	-
Lamb's-quarters	2 leaf
Nightshade (eastern black)	6 leaf
Redroot pigweed	6 leaf
Smartweed (including Lady's-thumb)	8 leaf
Wild Mustard	10 leaf

* Topgrowth control only. The plant will grow back from underground roots

****DO NOT add Assist adjuvant with the 1.0 L per acre rate as crop injury will result.**

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: No specific water volume is provided on the label but a minimum of 81 L per acre is implied by the adjuvant rates on the label. Good coverage of weed foliage is required for proper control.

Nozzles and Pressure: Use nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Soybeans may exhibit speckling, bronzing and/or leaf burn. The trifoliolate leaf emerging at the time of application may be distorted. Soybeans usually outgrow these conditions and continue to grow at a normal rate with no adverse effect on vigour, maturity, or crop yield. It is important to have good spray coverage on the weeds as Blazer works mainly by contact action. Failure to follow the suggested application rate and timing may result in unsatisfactory control.

Tank Mixes:

Blazer (0.5 L/acre) plus *Basagran Forté* (0.5 L/acre) or Blazer (0.255 L/acre) plus *Basagran** or *Basagran Forté* (0.71 L/acre) depending on predominant weed species present.

See label for details.

*Add Assist adjuvant at 0.5 L per 100 L of spray solution for *Basagran* tank mix only.

Fertilizers: None registered. DO NOT add fertilizers to the spray mixture.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *Blazer* label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 6 hours may reduce weed control.

Re-Entry: DO NOT enter treated fields for 12 hours.

Preharvest Interval: No specific preharvest interval is indicated on the label.

Grazing: DO NOT graze the treated crop or cut for hay.

Re-cropping: The label has no restriction on crops that may be planted the following season.

Aerial application: DO NOT apply by air.

Storage: DO NOT freeze.

Buffer Zones: Leave a buffer of 15 m from the last spray pass and sensitive upland areas such as other crops, pastures, rangeland, woodlots or shelterbelts.

Tank Cleaning:

See page 14 for general information on tank cleaning using Method B. Tanks may require cleaning after several tanks to remove any excessive oil buildup on the inside of the tank.

Hazard Rating:

Warning – Poison

Danger – Corrosive to eyes.

Warning - Causes skin irritation. Avoid contact with skin. Harmful if inhaled.

For an explanation of the symbols used here see page 11.

Broadband

Herbicide Group
1 - pinoxaden
2 - florasulam
(Refer to page 38)

Company:

Syngenta Canada

Formulation:

***Broadband* (PCP#29138):** 92.7 g/L pinoxaden and 7.7 g/L florasulam formulated as an emulsifiable concentrate.

Container size - 10.5 and 84.2 L.

***Adigor* Adjuvant (PCP#28151):** 11.3 and 90.4 L.

Crops and Staging:

Barley, spring wheat (NOT including durum) up to the emergence of the flag leaf.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Grass weeds controlled from 1 to 6 leaves and prior to the emergence of the 4th tiller:

Barnyard grass
Foxtail (green and yellow)
Proso (Crown) millet
Volunteer oat
Volunteer canary seed
Wild oat

Broadleaf weeds controlled at the 1 to 6 leaf stage:

Annual smartweed
  (including Lady's-thumb)
Common chickweed
Cleavers
Hemp-nettle†
Pigweed, redroot†
Shepherd's-purse
Sow-thistle (annual,
  perennial**)†
Stinkweed
Volunteer canola*
Wild buckwheat
Wild mustard

† Suppression only.

* Not Clearfield varieties.

** Applications made at advanced leaf stages will reduce product effectiveness.

Rates:

Broadband: 263 ml per acre.

Add *Adigor* adjuvant at 280 mL per acre.
(Package sizes listed above will treat 40 or 320 acres)

DO NOT apply more than once per season.

Application Information:

Water Volume: 20 to 40 L per acre.

Nozzles and Pressure: Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets. Low drift nozzles may require higher pressures for proper performance.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

DO NOT apply to crops or weeds that are stressed (frost, low fertility, drought or flooding, disease or insect damage) as crop injury or reduced weed control may result.

Temporary crop injury may occur with tank-mixes under extreme weather conditions or when the crop is suffering from stress due to inadequate or abnormally high moisture levels or extreme temperatures.

Tank Mixes:

Herbicides:

Curtail M (0.6 L/acre)

MCPA LV500 ester (0.28 L/acre)

Fungicides: *Tilt* (label rates)

Fertilizers: None registered

Note: The above mixes are those listed on the *Broadband* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Syngenta also supports the following mixes that are not on the *Broadband* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides: *Infinity; Prestige XC (low rate); Trophy.*

Fungicides: *Propel; Tilt (low rate).*

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 1 hour of application may reduce control.

Re-Entry: DO NOT re-enter treated fields within 12 hours.

Preharvest: Leave 60 days between treatment and harvest.

Grazing: DO NOT cut for livestock feed within 30 days or grazed by livestock within 7 days of treating the crop.

Recropping: No restrictions the year following treatment.

Aerial Application: DO NOT apply by air.

Storage: Store in dry, heated storage.

Buffer Zones:

Application method	Buffer Zones (metres †) Required for the Protection of:	
	Aquatic Habitats	Terrestrial habitat
Ground only*	5	30

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

⚠ Warning Eye Irritant

For an explanation of the symbols used here see page 11.

Bromoxynil

Herbicide Group
6 - bromoxynil
(Refer to page 38)

Company:

Bayer CropScience (*Pardner*)
IPCO (*Brotex*)
Nufarm Agriculture (*Koril 235*)
MANA Canada (*Bromotril*)

Formulation:

***Pardner* (PCP#18001):** 280 g/L bromoxynil formulated as an emulsifiable concentrate.
Container size - 2 x 8 L containers per case.

***Koril 235* (PCP#25341):** 235 g/L bromoxynil formulated as an emulsifiable concentrate.
Container size - 2 x 9.71 L containers per case.

***Bromotril* (PCP#28276) & *Brotex* (PCP#28519):** 240 g/L bromoxynil formulated as an emulsifiable concentrate.
Container size - 2 x 9.7 L containers per case.

Crops, Staging and Rates:

Pardner: At 0.40 to 0.48 L per acre one 8 L jug treats 20 to 16.5 acres.

Koril, Brotex & Bromotril: At 0.49 to 0.57 L per acre one 9.71 L jug treats 20 to 17 acres.

See the chart below for registered crops and specific rates and stages. NR = Not Registered.

CROP	STAGE	RATE (L / acre)			
		Pardner	*Koril*	*Bromotril*	*Brotex*
Barley, oats, triticale, wheat (spring and durum)	2 leaf stage to early flag	0.40 to 0.48	0.49 to 0.57	0.49 to 0.57	0.49 to 0.57
Winter wheat	2 to 4 leaf stage (fall application) First growth to early flag leaf (spring application)	0.40 to 0.48	0.49 to 0.57	0.49 to 0.57	0.49 to 0.57
Corn (field or sweet)	4 to 8 leaf	0.40 to 0.48	0.49 to 0.57	0.49 to 0.57	0.49 to 0.57
Corn (field or sweet) with drop pipes	Beyond 8 leaf	0.40 to 0.48	0.49 to 0.57	0.49 to 0.57	0.49 to 0.57
Canaryseed (seed production only)	3 to 5 leaf	0.40	0.49	0.49	0.49
Seedling alfalfa	2 to 6 trifoliate leaf stage	0.40	0.49	0.49	0.49
Established alfalfa (seed production only)	In spring, before the crop begins to shield weeds. Apply no more than twice in one growing season.	0.40 to 0.48	0.49 to 0.57	0.49 to 0.57	0.49 to 0.57
Fall rye	In spring only, from first growth to early flag	0.40 to 0.48	0.49 to 0.57	0.49 to 0.57	0.49 to 0.57
Flax (including Solin)	2 to 4 inches (5 to 10 cm)	0.40	0.49	0.49	0.49
Forage millet and sorghum	4 leaf to 8 inches (20 cm)	0.40	NR	0.49	0.49
Seedling grasses (seed production only): Bromegrass, Fescue (creeping red, meadow), Orchard grass, Reed canary grass, Russian wildrye, Timothy, Wheatgrass (crested, intermediate, slender, tall)	2 to 4 leaf (Establishment year only)	0.40 to 0.48	NR	0.49 to 0.57	0.49 to 0.57
Pearl millet and sorghum (grain)*	4 leaf to 8 inches (20 cm)	0.40	NR	NR	NR
Prior to direct-seeding cereal crops (mixed with glyphosate only)	Apply according to weed stage.	0.40	NR	0.49	0.49

NOTE: Since application to grain pearl millet and sorghum is registered under User Requested Minor Use Label Expansion program, the manufacturer assumes no responsibility for herbicide performance.* ***Users of this on product grain pearl millet and sorghum do so at their own risk.*

Weeds and Staging:

Weeds controlled at the 1 to 4 leaf stage:

American nightshade
Annual smartweed (green, pale, lady's-thumb)
Bluebur
Cocklebur
Common ragweed
Cow cockle*
Kochia**
Pigweed*†
Russian thistle**
Stinkweed*
Wild mustard*

Weeds controlled at the 1 to 8 leaf stage:

Common groundsel
Lamb's-quarters
Tame buckwheat
Tartary buckwheat
Wild buckwheat

* Controlled with high rate only.
** Apply before plants are 2 inches high.
† Not controlled in seedling alfalfa.

Application Information:

Water Volume:
Ground:
Corn, Millet & Sorghum: 80 to 120 L per acre.
Seedling grasses: 60 L per acre.
Other crops: 40 L per acre.
Aerial (wheat and barley only): 8 to 16 L per acre.

Nozzles and Pressure: Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver ***ASABE medium*** droplets.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Avoid spraying if temperatures are greater than 25°C. Leaf scorching may occur in corn and flax if applied during or after adverse growing conditions, such as cool and wet or hot (greater than 27°C) and humid weather.

Tank Mixes:

Herbicides:

CROP	TANK MIXES
Spring wheat	*2,4-D*†, *Achieve Liquid*, *Avenge*, *Avenge + MCPA* (ester only), *Everest 70WDG*††, *Horizon 240EC* , *MCPA*†
Winter wheat	*2,4-D*, *Achieve Liquid*, *MCPA*
Barley	*2,4-D*†, *Achieve Liquid*, *Avenge*, *Avenge + MCPA* (ester only), *MCPA*†
Oats	*MCPA*
Fall rye, canaryseed	*MCPA**
Flax	*MCPA* (amine, ester or K salt)
Seedling forage grasses***	*MCPA*
Corn	*Accent*◇ + surfactant (field corn only), *Atrazine***, *Banvel II* (field corn only)**

* The ester formulations are preferred but other formulations can be used.

** Do not add oil or surfactant to this mix. Do not use atrazine formulations that contain oil.

*** *Bromotril*, *Brotex* and *Pardner* only.

† May be applied by air.

†† *Pardner* only.

◇ *Since the use of this tank mix on corn is registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance.* ***Users of this tank mix on corn do so at their own risk.***

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the bromoxynil labels only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Bromoxynil **manufacturers may also support mixes with pesticides that are not on the** ***bromoxynil*** **labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 1 hour of application will reduce control.

Re-entry: DO NOT enter treated fields for 24 hours.

Grazing: DO NOT graze treated wheat, barley, oats, forage millet, sorgum or seedling alfalfa crops or cut for feed within 30 days of application.

DO NOT graze other treated crops or cut for hay prior to crop maturity.

Re-cropping: No restrictions.

Aerial Application: Registered for aerial application on wheat and barley. The use of low water volumes, 8 to 16 L per acre may result in less effective weed control than seen with ground application.

Storage: May be stored at freezing temperatures.

Will return to original state by warming to room temperature (20 to 22°C) and agitating thoroughly.

Buffer Zones:

Application method	Buffer Zones (metres [†]) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	1	1
Fixed wing aircraft**	20	5	55
Helicopter**	20	3	45

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy

**Wheat and barley crops only.

[†] Distance is measured from the downwind edge of the boom to sensitive areas.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

All:

☠ Warning – Poison

Brotex 240, Bromotril 240:

⚠ Warning – Eye and Skin Irritant

Koril 235:

❗ Danger – Eye and Skin Irritant
Potential Skin Sensitizer

For an explanation of the symbols used here see page 11.

Bromoxynil/2,4-D Ester

Herbicide Group
4 - 2,4-D
6 - bromoxynil
(Refer to page 38)

Company:

Bayer CropScience (*Thumper*)
IPCO (*Leader*)
MANA Canada (*Thrasher*)
Nufarm Agriculture (*Approve*)

Formulation:

***Thumper* (PCP#22659):** 280 g/L bromoxynil and 280 g/L 2,4-D ester formulated as an emulsifiable concentrate.
Container size - 8 L.

***Approve* (PCP#28123), *Leader* (PCP#28853) & *Thrasher* (PCP#28779):** 225 g/L bromoxynil and 225 g/L 2,4-D ester formulated as an emulsifiable concentrate.
Container size - 10 L.

Crops and Staging:

Spring wheat (including durum) and barley at the 4 leaf to early flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Weeds controlled at the 1 to 4 leaf stage:

American nightshade
Ball mustard
Bluebur
Cocklebur
Common ragweed
Cow cockle
Flixweed
Green smartweed
Lady's-thumb
Night-flowering catchfly
Pale smartweed
Redroot pigweed
Shepherd's-purse
Volunteer canola
Volunteer sunflower

Weeds controlled at the 1 to 8 leaf stage:

Common groundsel
Lamb's-quarters
Stinkweed
Tame buckwheat (up to 4 leaf stage with *Approve*)
Tartary buckwheat
Wild buckwheat
Wild mustard

Weeds Controlled from 1 to 12 leaf (max. 2 inches tall):

Kochia
Russian thistle

Rates:

***Thumper*:** 0.4 L per acre (one 8 L container treats 20 acres).

***Approve*, *Leader* or *Thrasher*:** 0.5 L per acre
(One 10 L container treats 20 acres).

Application Information:

Water Volume:
***Ground*:** 20 to 40 L per acre.
***Aerial*:** 12 to 16 L per acre. Use the higher volume when there is a heavy crop canopy, or when the majority of weeds are cow cockle, smartweed, or pigweed.

Nozzles and Pressure: Use 40 psi (275 kPa) when using conventional 80° or 110° flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE coarse*** droplets. All strainer and nozzle screens must be 50 mesh or coarser.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Less than acceptable weed control may be expected if weeds are under stress because of excessive moisture, drought, or cool weather.

Tank Mixes:

Herbicides:
In spring wheat (including durum) and barley:
Liquid Achieve (0.2 L/acre) plus Turbocharge aduvant
Avenge (1.4 to 1.7 L per acre)
Puma^{120} *Super* (0.15 to 0.31 L/acre)
In spring wheat (including durum) only:
Clodinafop 240EC (93 to 117 mL/acre)[Δ] plus adjuvant
In spring wheat(NOT including durum) only:
*Everest 70WDG**(17.4 grams per acre) plus approved non-ionic surfactant.

* *Approve*, *Leader* and *Thrasher* only.

[Δ] Manufacturers may only support specific mixes. Contact the manufacturer for more information.

Insecticides: None registered.

Fungicides: None registered.

Fertilizers: None registered.

Note: The above mixes are those listed on the *Bromoxynil/2,4-D Ester* labels only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

***Bromoxynil/2,4-D ester* manufacturers may also support mixes with pesticides that are not on the *Bromoxynil/2,4-D ester* labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Re-Entry: DO NOT enter treated fields for at least 24 hours.

Grazing: DO NOT graze or cut for livestock feed within 30 days of application. Withdraw meat animals 3 days before slaughter.

Preharvest Interval: DO NOT harvest within 30 days of application.

Re-cropping: No restrictions the year after application.

Aerial Application: May be applied by air.

Storage: May be frozen. Shake well before using after being frozen.

Buffer Zones:

Application method	Buffer Zones (metres †) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	1	1
Fixed wing aircraft	20	5	55
Helicopter	20	3	45

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy. Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

All Products:

☠ Warning – Poison

Thumper **and** *Approve*

⚠ Caution – Skin and Eye Irritant

Leader **and** *Thrasher*

☠ Warning – Skin and Eye Irritant

⚠ Potential Skin Sensitizer

For an explanation of the symbols used here see page 11.

Bromoxynil/MCPA ester

Herbicide Group
4 - MCPA
6 - bromoxynil
(Refer to page 38)

Company:

Bayer CropScience (*Buctril M*)
IPCO (*Logic M*)
Nufarm Agriculture (*Mextrol 450*)
MANA Canada (*Badge*)

Formulation:

***Buctril M* (PCP#18022):** 280 g/L bromoxynil and 280 g/L of MCPA ester formulated as an emulsifiable concentrate. Container size - 8 L.

***Mextrol 450* (PCP#26999), *Badge* (PCP#16164) & *Logic M* (PCP#28109):** 225 g/L bromoxynil and 225 g/L of MCPA ester formulated as an emulsifiable concentrate. Container size - 10 L.

Crops and Staging:

Field Crops:

All Products:

CROP	STAGE
Barley, oats, spring wheat (including durum)	2 leaf to early flag
Winter wheat	2 to 4 leaf stage in the fall or after growth resumes up to early flag leaf.
Fall rye	When growth commences in spring to early flag leaf
Canaryseed	3 to 5 leaf stage
Flax, Solin	2 inches (5 cm) to early bud stage. Best tolerance occurs when flax is 2 to 4 inches (5 to 10 cm) tall.
Corn	4 to 6 leaf stage

Seedling forage grasses†:
2 to 4 leaf stage†.

All Products:

- Bromegrass
- Fescue (creeping red, meadow)
- Reed canarygrass
- Russian wild-rye
- Timothy
- Wheatgrass (crested, intermediate, slender, tall)

Buctril M, Logic M and Badge only:

- Fescue (tall)
- Meadow bromegrass
- Meadow foxtail
- Orchard grass
- Wheatgrass (streambank)

Established Forage Grasses:

Timothy (seed† or hay††)** - prior to emergence of the flag leaf.

† Maximum of two treatments per year at least 21 days apart.

†† Maximum of two treatments per year at least 90 days apart.

Perennial Cereal Rye* **(*Buctril M* only):**

Established stands: 2 leaf up to early flag leaf stage.

Establishment year: 2 to 4 leaf stage in the fall, or from the time growth commences to early flag leaf stage in the spring.

* *Since the use of this tank mix on perennial cereal rye is registered under the User Requested Minor Use Label Expansion program, the manufacturer assumes no responsibility for herbicide performance.* ***Users of this tank mix on perennial cereal rye do so at their own risk.***

** Applications onto Timothy for hay production registered with *Buctril M*, *Logic M*, and *Mextrol 450* only.

Weeds and Staging:

Weeds up to 4 leaf stage:

- American nightshade
- Annual smartweeds (green, pale, lady's-thumb)
- Bluebur
- Ball mustard
- Cocklebur
- Cow cockle
- Flixweed
- Kochia**
- Night-flowering catchfly
- Redroot pigweed*
- Russian thistle**
- Scentless chamomile***
- Shepherd's-purse
- Volunteer canola
- Volunteer sunflower

* May not be controlled in flax.
** Control before plants are 2 inches tall.
*** Spring seedlings only.

Weeds up to 6 leaf stage:

Wild tomato (*Buctril M, Logic M & Badge* only)

Weeds up to 8 leaf stage:

- Common groundsel
- Common ragweed
- Lamb's-quarters
- Stinkweed
- Tame buckwheat
- Tartary buckwheat
- Wild buckwheat
- Wild mustard
- Wormseed mustard

Weeds suppressed in winter wheat from the 2 to 12 leaf stage:

Prickly lettuce (Mextrol 450 only)

Weeds where top growth is controlled:

- Canada thistle
- Perennial sow-thistle

Rate:

Buctril M: 0.4 L per acre. One 8 L jug treats 20 acres.

Mextrol 450, Badge & Logic M: 0.5 L per acre.
One 10 L jug treats 20 acres.

Application Information:

Water Volume:
Corn: 80 to 120 L per acre.
Flax, Solin: 20 to 40 L per acre.
Cereals: 20 to 40 L per acre.
Seedling forage grasses: 60 L per acre.
Established timothy: 60 L per acre.
Perennial Cereal Rye: Not less than 20 L per acre.
Aerial: 8 to 16 L per acre.

Nozzles and Pressure: Use 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE coarse*** droplets

Refer to specific labels for recommended water volumes.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Best weed control when humidity is high at the time of spraying and for the following day or two. Prolonged cool conditions may result in reduced weed control. Spraying during early morning may increase the risk of flax injury.

Avoid spraying in temperatures greater than 25°C.

DO NOT apply to flax, canaryseed or corn if daytime temperatures exceed 27°C within 48 hours before or after application.

Tank Mixes:

Herbicide Tank Mix Table:

Products listed below are at label rates for each crop. See labels for details.

CROP & TANK MIXES	Badge	Buctril M	Logic M	Mextrol 450
Flax (including Solin):				
Poast Ultra + Merge adjuvant	✓	✓	✓	✓
Clethodim + adjuvant	✓*	✓**	✓	✓*
Spring wheat (including durum) and Barley:				
Liquid Achieve	✓	✓	✓	✓
Ally	✓	✓	✓	✓
Avenge	✓	✓	✓	✓
MCPA (amine, ester & K)	✓	✓	✓	✓
Puma^{120} *Super*		✓	✓	✓
Refine SG (4 g/acre) #			✓	
Refine SG (rates above) + *Puma*^{120} *Super*			✓	
Spring wheat (including durum) only:				
Everest 70WDG				✓
Horizon 240EC	✓	✓	✓	✓
Puma^{120} *Super*	✓			
Spring wheat only (NOT including durum):				
Axial 100EC	✓			
Everest 70WDG	✓	✓	✓	
Spring wheat only (NOT including durum) and Barley:				
Axial 100EC		✓	✓	
Winter Wheat:				
Refine SG (4 g/acre)#			✓	
Oats:				
MCPA (amine, ester & K)	✓	✓	✓	✓
Corn:				
Atrazine	✓	✓	✓	✓

* *Select* only

** *Select* and *Centurion* only.

# Requires the addition of a surfactant as per *Refine SG*.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *bromoxynil/MCPA ester* labels only. To check for other possible mixes see the blue fold out chart inside the back cover.

***Bromoxynil/MCPA* manufacturers may also support mixes with pesticides that are not on the *bromoxynil/MCPA* labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Rainfall within 1 hour of application may reduce weed control.

Re-entry: DO NOT enter treated fields for at least 24 hours, or 15 days for corn to be harvested by hand.

Preharvest Interval: DO NOT harvest perennial cereal rye within 30 days of application.

Grazing: DO NOT graze treated grain or established timothy crops or cut for feed within 30 days of application. DO NOT graze meadow foxtail in the year of treatment. DO NOT graze other treated forage grasses within 56 days of treatment.

Preharvest Interval: DO NOT harvest Flax or Solin within 60 days of application.

Re-cropping: No re-cropping restrictions the year after treatment.

Aerial Application: May be applied by air to wheat, barley, and oats only. Use higher water volume (see '**Application Information**') when the majority of weeds are cow cockle, smartweed, hemp-nettle, pigweed, and Canada thistle.

Storage: May be frozen. Shake the container well when thawed to reconstitute components before use.

Buffer Zones:

Application method	Crop	Buffer Zones (metres †) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Ground only*	All	1	1	4
Fixed wing aircraft	Oats	15	2	60
	Barley & wheat	20	5	60
	Rye	1	0	60
Helicopter	Oats	15	1	50
	Barley & wheat	20	3	50
	Rye	1	0	50

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Badge. Buctril M, Logic M:

◈ Warning

Mextrol 450

☠ Danger – Poison

◇ Warning – Skin Irritant
Potential Skin sensitizer

▽ Caution – Eye irritant

For an explanation of the symbols used here see page 11.

Casoron

Herbicide Group
20 - dichlobenil
(Refer to page 38)

Company:

Chemtura Canada (PCP#12533)

Formulation:

4% dichlobenil formulated as a granular.
Container size - 15 kg, 22.7 kg.

Crops:

Poplar plantations

Shelterbelts consisting of the following species:

Ash
Barberry
Birch (cutleaf-weeping)
Juniper
Lilac
Linden
Boxwood
Caragana
Cedar (White, Eastern Red)
Crabapple
Elm
Euonymus (Burning bush)
Forsythia
Honeysuckle
Locust
Maple
Mock orange
Poplar
Rose
Spirea
Willow

NOTE: DO NOT apply to shelterbelts with mugo pine, firs, hemlock, holly, spruce or other shallow rooted species or injury may result. DO NOT apply in or around greenhouses. DO NOT use on light sandy soils.

Weeds and Staging:

Apply in early spring or late fall prior to annual weed emergence, or after cultivation has removed existing weeds.

- Annual blugrass
- Artemisia (absinthe,* wormwood, sage)
- Bindweed*
- Canada thistle*
- Chickweed
- Dandelion*
- Foxtail (green and yellow)
- Groundsel
- Horsetail
- Knotweed
- Kochia
- Lamb's-quarters
- Loosestrife
- Mustard
- Nutsedge*
- Pigweed
- Plantain
- Purslane
- Quack grass*
- Sheep sorel*
- Shepherd's-purse
- Smartweed
- Sow-thistle
- Spurge
- Vetch*
- Wild buckwheat*

* Controlled with fall applications at the higher rates.

Rates:

45 to 70 kg per acre.

At the low rate, a 15 kg bag will treat a 4 yd by 407 yd (4 m by 340 m) strip of shelterbelt. At the high rate, a 15 kg bag will treat a 4 yd by 256 yd (4 m by 214 m) strip of shelterbelt. If application is followed by 0.5 to 1.0 inches (1.3 to 2.5 cm) of irrigation, the lower rates are recommended.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

DO NOT apply during periods of high soil temperatures (more than 15°C).

Tank Mixes:

None registered.

Restrictions:

Rainfall: Does not reduce activity.

Re-entry: DO NOT enter treated areas for at least 24 hours.

Grazing: DO NOT graze in treated area.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool, dry place. DO NOT freeze.

Buffer Zones: Site characteristics and conditions that may lead to runoff include, but are not limited to, heavy rainfall, moderate to steep slope, bare soil, poorly draining soil (e.g., soils that are compacted, fine textured or low in organic matter). Avoid application of this product when heavy rain is forecast.

Equipment Cleaning:

Refer to page 15.

Hazard Rating:

No specific rating. Keep out of reach of children.

Harmful if swallowed.

Avoid skin or eye contact.

CleanStart

Herbicide Group
9 - glyphosate
14 - carfentrazone
(Refer to page 38)

Company:

Nufarm Agriculture

Formulation:

One case of *CleanStart* contains 2 components:

Credit **(PCP#25866):** 356 g/L glyphosate formulated as a solution.

Container size - 2 x 10 or 450 L.

Aim **(PCP#28573):** 240 g/L carfentrazone formulated as an emulsifiable concentrate.

Container size - 1 x 600 mL or 4 x 3.38 L.

Crops and Staging:

Prior to the seeding of most crops* including the following:

Barley
Beans, dry
Buckwheat
Canola
Chickpea
Corn
Flax
Lentil
Millet (pearl and proso)
Mustard
Oats
Peas, field
Potato*
Rye
Safflower
Sorghum
Soybean
Sunflower
Triticale
Wheat

*Note – before using any pesticide on potatoes, consult the list of "*Agricultural Pesticides Approved for Use*", available from Simplot Canada and McCain Foods (Canada).

Harvest Aid Treatment:
CleanStart may be applied to the following crops when seed is at less than 30% moisture to speed the rate of dry-down of the following crops and green weedy material. See glyphosate preharvest uses for additional staging information.

CROP*	RATE		
	Credit (glyphosate) (g ae/acre)†	Aim (mL/acre)	Acres per case
Barley, chickpea, dry bean, field pea, oats, wheat,	360†**	30	20

* DO NOT apply to crops if grown for seed purpose.
† Equivalent to 1L per acre of a 360 g/L formulation.

Weeds, Rates and Staging (Pre-seeding):

Credit* 0.5 to 1.0 L per acre plus *Aim* at 15 to 30 mL per acre (40 to 20 acres per case or 900 to 450 acre bulk): *Weeds controlled by glyphosate at the above rates plus rapid burnoff of:

Chickweed
Dandelion (spring seedlings only)
Shepherd's-purse
Kochia (including glyphosate resistant biotypes**)
Tansy mustard
Volunteer canola (including all herbicide tolerant varieties)*

Apply to actively growing weed up to 10 cm in height.

* 1 to 3 leaf stage for glyphosate tolerant volunteer canola

** Use highest registered rate to control glyphosate resistant kochia.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: Minimum 40 L per acre. Higher water volumes will give better performance from the carfentrazone active. Use higher volumes when weed populations are dense.

Nozzles & Pressure: Sprayers without drift reduction nozzles should use maximum pressure of 30 psi (210 kPa). Low drift nozzles may require higher pressures for proper performance. Apply using nozzle and pressure combination that deliver an even spray pattern with good coverage with *ASABE medium* droplets.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Most effective control is achieved when grasses are actively growing. Weeds stressed by drought, flooding, hot or prolonged cool temperatures (<15°C) and poor fertility are more difficult to control. Symptoms of carfentrazone activity on weeds may be accelerated by warm moist conditions. Weeds hardened off by drought may be more difficult to control.

Tank Mixes:

Herbicides:
Aim (17 mL/acre)
Fungicides: None registered.
Insecticides: None registered
Fertilizers: None registered.
Do not use with additives that are used to modify spray pH.

Restrictions:

Rainfall: Rainfall within 6 to 8 hours after application may reduce activity. Avoid application when heavy rainfall is forecast.
Re-Entry: DO NOT re-enter treated fields for at least 12 hours.
Preharvest Interval: Leave a minimum of 3 days between harvest aid treatment and harvest.
Grazing: DO NOT graze the treated crop or cut for feed.
Re-cropping: *CleanStart* may be applied as a preseed burnoff prior to the seeding of most crops. Check the product label for a complete list. There are no rotational restrictions 12 months after application.

Aerial Application: DO NOT apply by air

Storage: Store in a cool dry location.

Buffer Zones: Leave a buffer of 3 meters from the downwind edge of the boom to sensitive upland habitats. Apply near wetlands only when wind is blowing away from wetlands.
Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

Tank Cleaning:

Sprayers used to spray *CleanStart* should be drained and flushed out immediately after use. The manufacturer recommends that sprayers used to apply this product be flushed with a water/ ammonia rinse (3 L of 3% ammonia per 100 L of water) by circulating for a minimum of 15 minutes through the tank and all hoses, booms and nozzles. All nozzles, screens and filters should be removed (including disassembly of multi-nozzle assemblies) and cleaned after applying this product. If possible leave the ammonia solution in the tank overnight to enhance cleaning. Rinse the tank, booms, hoses, and nozzles with clean water to complete the process.

DO NOT clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

▽ Caution – Skin and Eye Irritant

For an explanation of the symbols used here see page 11.

Clethodim

Herbicide Group
1 - clethodim
(Refer to page 38)

Company:

Arysta LifeScience (*Select* - PCP#22625)
Bayer CropScience (*Centurion* - PCP#27598)
MANA Canada (*Arrow* - PCP#28224)
Viterra (*Shadow RTM* - PCP#29277)

Formulation:

240 g/L clethodim formulated as an emulsifiable concentrate. Container size - 3 L.

Crops, Rates and Staging:

Crops are tolerant at all growth stages although maximum rates but Preharvest Intervals must be observed to prevent excess residue in the grain (see 'Restrictions:').

To a maximum rate of 75 mL per acre:

Chickpeas*
Dry beans# (black, great northern, navy, pink, pinto, red)
Prairie Carnation**†Δ

To a maximum rate of 150 mL per acre:

Alfalfa (seedling only)
Canola
Coriander** †Δ
Fenugreek*** †Δ
Field peas
Flax (including Solin)
Lentils
Mustard, condiment (brown, oriental, yellow)
Mustard, oilseed types (*B. juncea*)Δ
Potato
SafflowerΔΔ †
Soybean
Sunflower

* Apply up to the 9 node stage (7 inches or 18 cm maximum height)

** Apply in the 2 to 5 leaf stage, one application per year.

*** Apply in the 3 to 5 leaf stage, one application per year.

# Registered for all *Phaseolus vulgaris* varieties. Since not all varieties of dry beans have been tested for tolerance to *clethodim*, first use of *clethodim* should be limited to a small area of each variety to confirm tolerance. *Arrow* and *Shadow RTM* are registered for use on black, great northern, navy, pink, pinto, and red dry bean types

Δ *Select*, *Centurion* and *Shadow RTM* only.

ΔΔ *Centurion* only.

† *NOTE: Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance.* ***Those who apply these uses do so at their own risk.***

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds, Rates and Staging:

DO NOT apply more than a total rate of 150 mL per acre of these products, or other products containing clethodim, to the same field per season.

Adjuvants: *Clethodim* products must be applied with 0.5 L of *Amigo* adjuvant (*Centurion, Shadow RTM* or *Select*) or *X-ACT* adjuvant (*Arrow*) per 100 L of spray solution (unless otherwise indicated on the label). For spray water sources high in bicarbonate ions (CO_3) see 'Effects of Growing Conditions' section below.

Refer to the product labels for complete mixing instructions. A general guide to mixing can be found on page 13

WEED	RATE (mL/ ACRE)	ACRES TREATED PER 3 L CONTAINER	STAGE
Barnyard grass, foxtail (green, yellow)*†, proso millet, volunteer cereals (barley*†, canary seed, corn, oat*†, wheat*†), wild oat†	50**	60	Apply at 2 to 6 leaf stage. † *Apply at the 2 to 4 leaf stage when treated with the 60 acre rate.* *For best results in either case, apply at the 2 to 3 leaf stage*
Moderate to heavy infestations of the above grasses, plus Persian darnel	75	40	
Quackgrass (suppression only)	75	40	2 to 6 leaf stage when 3 to 6 inches (6 to 15 cm) tall. For best results, apply at the 3 to 5 leaf stage
Quackgrass (season long control)	150***	20	

* Apply to light infestations of these weeds only for the 60 acre per jug rate. The manufacturers do not provide guidelines for weed densities under light infestations. When in doubt as to the level of weed infestation, use the higher rate or contact the manufacturer.

** At this rate, *clethodim* should NOT be tank mixed with any other pesticide and should only be applied under the following growing conditions: good crop stand, within the recommended leaf staging (2 to 3 leaf is optimum timing) prior to tillering, light weed infestations, adequate moisture and fertility, absence of stress, and good growing conditions.

*** Apply with 10 L of adjuvant per 1000 L of spray solution (*Amigo* adjuvant with *Centurion, Shadow RTM* and *Select*, *X-ACT* adjuvant with *Arrow*).

Refer to the product labels for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume:

Ground: 20 to 40 L per acre. 40 L per acre under dense weed infestations or dense crop canopies.

Aerial: Minimum of 11.3 L/acre.

Nozzles and Pressure: Use 40 psi (275 kPa) when using conventional 80° flat fan nozzles tilted forward at a 45° angle. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver proper coverage with ***ASABE medium*** droplets or larger.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Clethodim will be less effective when plants are stressed by lack of moisture, excessive moisture, low temperature and/or very low relative humidity. Re-growth of tillers may occur if application is made under any of the above stress conditions.

Clethodim activity is reduced by levels of bicarbonate ions in spray water equal to or greater than 500 ppm. The addition of ammonium sulphate at 1.6 L/acre (480 g/L liquid) or 0.8 kg/acre (99% dry), or the addition of 28-0-0 liquid fertilizer at 0.5 L per acre to the tank prior to the addition of clethodim has been shown to restore control.

Tank Mixes:

Clethodim may be tank mixed with other pesticides at the 75 to 150 mL per acre rates. Add the recommended amount of adjuvant with all tank mixes unless otherwise indicated.

Herbicides:

In flax (not including solin):

Bromoxynil/MCPA ester (label rates) Δ

Curtail M (0.6 to 0.8 L/acre)†

MCPA ester (rates for flax).

Lontrel at 0.23 to 0.34 L/acre. †

In solin (low linolenic flax):
Bromoxynil/MCPA ester (label rates) Δ
Curtail M (0.6 to 0.8 L/acre)†
Lontrel at 0.23 to 0.34 L/acre†**

In canola:
Lontrel at 0.17 to 0.34 L/acre†
Muster at 8 to 12 g/acres† (redroot pigweed is controlled at the 8 g/acre rate of *Muster* in this tankmix).

In Clearfield canola only:
Pursuit at 42 to 85 mL/acres†

In Liberty Link canola only:
Liberty at 1.1 to 1.35 L/acre plus *clethodim* at 25.5 mL/acre (120 acres/case) to enhance control of wild oat and volunteer cereals. When mixing add adjuvant to the water first, then *Liberty*, then *clethodim*. Consult labels for detailed mixing instructions.

In field peas:
Pursuit (85 mL/acre)†

In Glyphosate tolerant soybean:
Glyphosate (540 g ai formulation) at 0.68 to 1.35 L/acre.† ✧

* Light infestations only in Clearfield canola. For heavy infestations, use high rate of *Pursuit*.
** *Select* and *Centurion* only
† Apply with the 75 mL/acre rate of clethodim only.
Δ Manufacturers may only support specific mixes. Contact the manufacturer for more information.
✧ *Arrow* only.

Allow 4 days between application of clethodim and any other chemical not recommended as a tank mix combination on the label.

Fertilizer: None registered.

Insecticide: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *clethodim* labels only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

***Clethodim* manufacturers may also support mixes with pesticides that are not on the clethodim labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 1 hour may reduce control.

Grazing: DO NOT graze or cut treated crops for forage until 60 days after application of clethodim to annual crops, and 30 days after application to seedling alfalfa.

Re-Entry: DO NOT enter treated fields for 12 hours.

Preharvest Interval:

Preharvest Interval (days)	**CROP(S)**
30	Alfalfa, fenugreek
60	Canola, coriander, dry beans, flax (including Solin), lentils, potatoes, chickpeas (Desi and Kabuli) or mustard (brown, yellow, oriental)
72	Sunflower
75	Soybeans, field peas

Aerial Application: Only *Centurion* and *Select* may be applied by air.

Storage: May be stored at any temperature. Shake well before use.

Other: DO NOT apply more than 0.15 L per acre to the same land area per season.

Buffer Zones:

Application Method	Crops	Buffer Zones (metres †) Required for the Protection of:
		Terrestrial habitat
Ground	All Crops	15
Aerial	Desi and Kabuli chickpeas, dry common beans	15
	Other Registered Crops	20

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy
† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Select, Shadow and Centurion:

◇ Warning – Skin and Eye Irritant

Arrow:

▽ Caution – Skin and Eye Irritant

For an explanation of the symbols used here see page 11.

Clodinafop

Herbicide Group
1 - clodinafop
(Refer to page 38)

Company:

AgWest
(*Slam'R* - PCP#30137; *Slam'R COC Adjuvant* - PCP#30138)

Arysta LifeSciences
(*NextStep NG* - PCP#29614, built in adjuvant)

Cheminova
(*Bullwhip* - PCP#30445; *XA Oil Concentrate Adjuvant* - PCP#11769)

Farmers of North America
(*Aurora* - PCP#29711; *Chem-Spray COC Adjuvant* - PCP#29712)

IPCO
(*Legend* - PCP#29526; *Legend B Adjuvant* - PCP#29527)

MANA Canada (*Ladder* - PCP#29495;
XA Oil Concentrate - PCP#11769)

Nufarm Agriculture
(*Signal* - PCP#29172; *Signal* Adjuvant - PCP#29173)
(*Nufarm Clodinafop*-PCP#29962; *Enhance Adjuvant*-PCP#29952)

Syngenta Canada
(*Horizon 240EC** - PCP#24076; *Score* Adjuvant - PCP#20475)
(*Horizon NG* - PCP#29089; built in adjuvant)

Viterra
(*Foothills NG* - PCP#30341; built in adjuvant)

* This product is no longer manufactured but some product still remains in the retail system. This product may not be in future editions.

Formulation:

Aurora, BullWhip, Horizon, Foothills, Ladder, Legend, Nextstep, Signal, Nufarm Clodinafop, Slam'R: 240 g/L clodinafop-propargyl formulated as an emulsifiable concentrate.

Container size - 3.68 L, 18.4 L or 2 x 11.04 L.

Score, Foothills, Slam'R COC, Signal, Steppe **and** ***XA Oil Concentrate Adjuvants:*** 2 x 6.4 L.

Enhance Adjuvant: 20 L.

Horizon NG*, Foothills NG*, NextStep NG*: 60 g/L clodinafop-propargyl formulated as an emulsifiable concentrate.

Container size - 2 x 7.57 L, 121.1 L or 424.4 L.

* These products have a built in adjuvant system and does not require the addition of an adjuvant.

Crops and Staging:

Spring wheat (including durum) - prior to the emergence of the 4th tiller.

When tank mixing, check broadleaf product description for additional restrictions.

Weeds, Rates and Staging:

NG Formulations: 376 mL per acre, no additional adjuvant required (packages listed above treat 40, 322 or 1129 acres);
-or-
240EC Formulations: 93 mL per acre plus recommended adjuvant at 0.8 L per 100 L spray solution (or for *Nufarm Clodinafop* and *Signal* only add ***Enhance*** **adjuvant** at 0.25 L per 100L spray solution).

For control of:

WEED	STAGE
Barnyard grass	1 to 5 leaf prior to tillering
Green and yellow foxtail	1 to 5 leaf stage, prior to emergence of 3rd tiller
Volunteer canaryseed, wild oats	1 to 6 leaf, maximum 3 tillers
Volunteer oats	3 to 6 leaf, maximum 3 tillers

NG Formulations: 474 mL per acre, no additional adjuvant required (package sizes above treat 32, 258 or 903 acres);
-or-
240EC Formulations: 115 mL per acre plus recommended adjuvant at 1.0 L per 100 L spray solution of the recommended adjuvant (or for *Nufarm Clodinafop* and *Signal* only add ***Enhance*** **adjuvant** at 0.32 L per 100L spray solution).

For control of:

WEED	STAGE
Persian darnel	1 to 5 leaf prior to tillering

Apply at the 2 to 3 leaf stage for optimum control.
Optimum weed control and yield response occurs when weeds are controlled before tillering.
Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume:
Ground – 20 L to 40 L per acre.
Aerial – 12 L/acre.

Nozzles and Pressure: 40 to 45 psi (275 to 310 kPa) when using conventional 80° or 110° flat fan stainless steel nozzles tilted forward at an angle of 45°. Low drift nozzles may require higher pressures for proper performance. Consult with herbicide manufacturer regarding the suitability of low drift nozzles for use with this product.

Tank Mixes:

Mixes provide control of wild oat, green foxtail, and weeds/insects controlled by the tank mix partner unless otherwise noted.
Herbicides:

	Aurora	*BullWhip*	*Horizon 240*	*NG Formulaitons*	*Ladder*	*Legend*	*Nufarm Clodinafop*	*Signal*	*Slam'R*
2,4-D amine (0.34 to 0.45 L/acre) ††	•	•	•	•	•	•	•	•	•
Bromoxynil #	•	•	•	•	•	•	•	•	•
*Bromoxynil/MCPA**** #	•	•	•	•	•	•	•	•	•
Bromoxynil/2,4-D (label rates)	•	•	•	•	•	•	•	•	•
Curtail M (0.6 to 0.81 L/acre)	•	•	•	•	•	•	•	•	•
Dichlorprop/2,4-D (0.71 L/acre)**	•Δ	•	•Δ	•Δ	•Δ	•Δ	•Δ	•Δ	•Δ
DyVel (0.4 to 0.50 L/acre)	•	•	•	•	•	•	•	•	•
Lontrel (0.17 to 0.34 L/acre)			•	•	•	•		•	
Lontrel (0.11 to 0.17 L/acre) + *MCPA ester* (0.45 L/acre)††	•	•	•	•	•	•	•	•	•
MCPA amine or ester†† (0.34 to 0.45 L/acre)	•	•	•	•	•	•	•	•	•
MCPA Sodium Salt (0.48 to 1.09 L/acre)*			•	•	•	•		•	
Mecoprop-p (2.2 to 2.8 L/acre)			•	•	•	•		•	
Metsulfuron (3 g/acre)††† #	•		•	•	•	•	•	•	•
Pulsar (80 acres / case)			•	•					
Pulsar + MCPA Ester (rates above)				•					
Refine SG (12 g/acre) ††† or (N = *Nimble* (8 g/acre)††† #		N	•	•		•		•	
Target (0.4 to 0.6 L/acre)**			•	•	•	•		•	
Trophy (20 acres per case)			•	•	•	•		•	

Refer to the broadleaf herbicide label for crop staging, and other information. When tank mixing *clodinafop 240 EC*, always add the broadleaf herbicide first, followed by *clodinafop*, with the adjuvant added last. Reductions in green foxtail and wild oat control may be observed when tank mixed with *2,4-D amine* and *MCPA amine*.

Fertilizers: None registered.

Insecticides: *Matador* (25 to 33 mL/acre) .✧

Fungicides: *Tilt* (0.1 L# to 0.2 L/acre).✧

Clodinafop may also be mixed with *Matador* plus *Tilt* at the rates above.✧

# Check product label for specific tank mix partners and appropriate rates

Δ NOT for use with *Estaprop XT* or *Dichlorprop DX*.

* Rate above 0.81 L/acre may cause crop injury.

** Barnyard grass also controlled.

*** Barnyard grass and Persian darnel also controlled. May be applied by air.

†† Rates for 500 g ai/L formulations are given. Other formulation strengths are also permitted.

††† Additional adjuvants are not required.

✧ All products except *Aurora*

Note: The above mixes are those listed on the *clodinofop* labels only. To check for other possible mixes see the blue fold out chart inside the back cover.

***Clodinafop* manufacturers may also support mixes with pesticides that are not on the *clodinafop* labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 14.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

For optimum results, apply to actively growing weeds. Do not apply to crops or weeds that are stressed by hot or cool conditions, frost, drought, low fertility, water-saturated soil, disease or insect damage as crop injury and poor weed control may result.

Restrictions:

Rainfall: Within 30 minutes may reduce control.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze or harvest treated crops for forage within 3 days of application.

Preharvest: Leave at least 60 days from application to harvest.

Re-cropping: No restrictions in the year following treatment.

Storage: May be frozen.

Aerial Application: May be applied by air.

Buffer Zones:

Application method	Buffer Zones (metres †) Required for the Protection of:	
	Aquatic Habitats	Terrestrial habitat
Ground *	15	0
Aerial	72	76

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

240EC formulations:

▽ Caution – Poison

◇ Warning – Eye and Skin Irritant

NG formulations:

▽ Caution – Eye and Skin Irritant

All except *Ladder*:

◇ Warning – contains the allergen soy.

For an explanation of the symbols used here see page 11.

Curtail M

Herbicide Group
4 - clopyralid & MCPA
(Refer to page 38)

Company:

Nufarm Agriculture (PCP#22764)

Formulation:

50 g/L clopyralid and 280 g/L MCPA ester formulated as an emulsifiable concentrate.

Container size - 8 L.

Crops and Staging:

Apply at the 3 leaf to just before the flag leaf stage of the following crops:

Barley
Canaryseed*
Oat
Timothy (established for seed, and hay or forage production)*
Wheat (spring & durum)

Flax, solin (low linolenic acid flax) at 2 to 6 inches (5 to 15 cm) height.

NOTE: Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance.* ***Those who apply these uses do so at their own risk.*

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds, Rates and Staging:

The following weeds are controlled at the 1 to 4 leaf stage unless specified:

At 0.61 L per acre (8 L jug treats 13 acres) for light infestations of:

Burdock
Canada thistle***
Cocklebur
Field horsetail†
Flixweed**
Lamb's-quarters
Plantain†
Prickly lettuce
Ragweed
Shepherd's-purse**
Stinkweed**
Sunflower annual
Volunteer sunflower
Wild mustard
Wild radish
Vetch

At 0.81 L per acre (8 L jug treats 10 acres) for medium to heavy infestations of the above weeds and:

Annual sow-thistle
Canada thistle***
Common groundsel
Dandelion*
Kochia (suppression only)**
Perennial sow-thistle†
Redroot pigweed
Russian pigweed
Scentless chamomile**
Smartweed
Tartary buckwheat
Volunteer canola
Wild buckwheat

* Spring rosettes only.
** 2 to 4 leaf stage, (spring seedlings only for winter annuals).
*** Season long control, some regrowth may occur in the fall. Apply from the 4 inch (10 cm) to prebud stage.
† Top growth control only.

Application Information:

Water Volume:
Canary seed and timothy: 40 to 80 L per acre
All other crops: 40 to 60 L per acre.

Nozzles & Pressure: Use 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Select the nozzle and pressure combination that produces of ***ASABE coarse*** droplets while maintaining good coverage of foliage. Flat fan tips tilted forward at a 45° angle are recommended in flax.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

When weeds are stressed because of drought, flooding, hot or cool (less than 15°C) temperatures, weeds are not actively growing and control may be reduced. DO NOT apply to weeds stressed longer than 20 days from lack of moisture as poor control can result.

Tank Mixes:

Curtail M at 0.81 L per acre should be used in all tank mixes unless otherwise indicated. See labels for adjuvant rates.

Herbicides:

In spring wheat (including durum) and barley:
Achieve Liquid (0.20 L/acre) plus *Turbocharge* adjuvant

Assert (0.52 to 0.64 L/acre) plus water pH adjuster
Puma^{120} Super (0.16 to 0.31 L/acre)

In spring wheat (not including durum) and barley:
Axial 100EC (0.24 L/acre) plus *Adigor* adjuvant.

In spring wheat (including durum):
Horizon 240EC (93 to 117 mL/acre) plus *Score* adjuvant.

In spring wheat (NOT including durum):
Everest 70WDG (17.4 g/acre) plus *Ag-Surf* or *Agral 90* adjuvant

Check product labels for additional crop staging restrictions.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *Curtail M* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 6 hours will reduce control.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze treated fields or cut for hay within 7 days of application.

Preharvest Interval: Leave 60 days between application and harvest.

Re-cropping: Wheat, barley, oats, rye, corn, flax, canola, forage grasses and mustard may be planted the year after application. DO NOT under-seed crops to forage legumes the year after treatment.

DO NOT seed to field peas for at least 10 months following treatment. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application delay seeding field peas an additional 12 months (22 months following application). Contact your local Nufarm Agriculture Inc. representative or retailer for more information before seeding field peas following drought conditions in the previous year.

DO NOT sow ***any other*** crops until the second year after application. Apply manure bedded with straw from treated crops only to the crops listed above.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool (above 5°C), dry area. If product is frozen, bring to room temperature and agitate before use.

Buffer Zones:

Application method	Buffer Zones (metres[†]) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	4

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

[†] Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Spray when winds are under 16 km/hr, but not dead calm.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Caution – Poison

⚠ Caution – Eye Irritant

For an explanation of the symbols used here see page 11.

Dicamba

Herbicide Group
4 - dicamba
(Refer to page 38)

Company:

BASF Canada (*Banvel II*) (*Banvel VM* - distributed by Engage Agro)

Gharda Chemicals Ltd. (*Oracle, VMD 480 Dicamba, Hawkeye Power* - Distributed by Adjuvants Plus)

Formulation:

***Banvell II* (PCP#23957) , *Banvel VM* (PCP#29249)::** 480 g/L dicamba formulated as a solution of a diglycolamine salt.

***Oracle* (PCP#26722), *VMD 480 Dicamba* (PCP#29251), *Hawkeye Power* (PCP#29223):** 480 g/L dicamba formulated as a solution of a dimethylamine salt.

Container sizes: 2 x 10 L jugs.

Crops, Rates and Staging:

Banvel II, Oracle, Hawkeye Power and *VMD 480 Dicamba* are registered for the all of the uses below. *Banvel VM* is only registered for pasture and rangeland uses below.

CROP	STAGE	RATE	
		(mL per acre)	Acres per 10 L
Spring wheat*	2 to 5 leaf.	93 to 117	107.5 to 85
Barley*	2 to 5 leaf.	93 to 117	107.5
Oats*	2 to 5 leaf.	93 to 117	107.5 to 85
Canaryseed*	3 to 5 leaf.	117	85
Winter wheat*	In spring 6 to 10 inches (15 to 25 cm) - prior to flag leaf	93 to 117	107.5 to 85
Spring rye*	2 to 3 leaf	93 to 117	107.5 to 85
Corn, field	Broadcast up to 8 inches (20 cm). When higher, use drop-nozzles.	243 to 505	41 to 20
Corn, field + 2,4-D	Apply no later than 2 weeks prior to tassle emergence and prior to 20 inches (50 cm).	117	85
Red fescue (for seed production)	*Seedling:* 2 inches (5 cm) tall. *Established:* up to the flag leaf stage.	243	41
Pastures	Established and actively growing	850 to 1,480 (0.85 to 1.48 L)	11.7 to 6.8
Seedling grasses (for seed and forage production): Fescue (creeping red, meadow, tall), Meadow foxtail, Orchardgrass, Smooth bromegrass, Timothy, Wheatgrass (crested, intermediate, pubescent, slender, streambank, tall)	2 to 4 leaf	93 to 117	107.5 to 85
Fall stubble	Apply according to weed stage.	1000 (1.0 L)	10
Fall stubble + glyphosate	Apply according to weed stage.	500	20
Pre-seeding cereals	Apply according to weed stage.	127	79
Chemfallow + 2,4-D	Apply according to weed stage.	93 to 117	107.5 to 85
Chemfallow + glyphosate	Apply according to weed stage.	117 to 243	85 to 41

* Should be mixed with a tank mix partner for broad spectrum control

Weeds, Rates and Staging:

Apply to annual broadleaf weeds at the 2 to 3 leaf stage and to winter annual rosettes up to 2 in. (5 cm) across.

Dicamba applied alone at 93 to 117 mL per acre will control:

Cleavers (high rate only)
Cow cockle
Corn spurry
Canada thistle*
Lady's-thumb
Perennial sow-thistle*
Smartweed (green)
Tartary buckwheat
Wild buckwheat

Dicamba at 0.25 to 0.5 L per acre will control:
Weeds listed above plus:

Canada thistle**
Canada fleabane
Field bindweed**
Lamb's-quarters
Mustard (hare's-ear, Indian, tumble, wild, wormseed)
Perennial sow-thistle**
Pigweed (redroot, Russian)
Ragweed (common, false, giant)

Dicamba at 0.85 L per acre in rangeland or 1.0 L per acre in summerfallow will control:
Weeds listed above plus:

Curled dock*
English daisy
Goldenrod
Tansy ragwort

Dicamba at 1.86 L per acre will control:
Weeds listed above plus:

Diffuse knapweed
Goat's-beard
Ground cherry
Pasture sage
Povertyweed
Sheep sorrel
Thyme-leaved spurge

* Top growth only.
** Three consecutive years of treatment are required for complete control.

The following chart indicates weed and brush controlled by dicamba + 2,4-D mixes at the listed rates.

WEEDS	RATE (L/acre)†	
	Dicamba	2,4-D (600 g/L forms)
Poison ivy	0.67	0.76
Wild carrot	0.85	0.76
Aspen poplar	1.32	1.52
Prickly rose, western snowberry†††	1.48	1.52
	RATE (L/1000 L of water)††	
Alder, aspen poplar, cherry, western snowberry, wolf willow, wild rose	0.85	1.33

† Applied by broadcast sprayer.

†† Apply to the foliage and stems to the point of run-off using high volume equipment.

††† Ester formulations of 2,4-D only.

Canada thistle, Perennial sow-thistle in summerfallow: Apply prior to the bud stage. Must be applied to thistle plants with 6 to 10 inches (15 to 25 cm) of new growth.

Canada thistle control in fall stubble: When thistles exhibit new growth and at least 2 weeks prior to a killing frost.

Refer to label for full lists of weeds controlled by dicamba plus tank mixes in cereals, pastures, summerfallow and other situations.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Brush control in pastures: When brush is actively growing and is 6 feet (2 m) in height or less (in spring or early summer). Growth greater than 2 meters may be cut and allowed to regrow prior to treatment.

Application Information:

Water Volume:
Preseeding burnoff: 20 to 45 L per acre.
Annual crops: at least 45 L per acre.
Pastures, summerfallow and stubble: 45 to 90 L per acre.
Corn: 90 to 140 L per acre.
Brush: high volumes to the point of run-off.

Nozzles and Pressure:
Broadcast application: Maximum 40 psi (275 kPa) with conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver even coverage of ***ASABE coarse*** droplets.

Brush Control: Use high volume spray equipment producing large droplets including, but not limited to, hand-wand, boomless nozzle and Radi-Arc technologies.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Crop damage (stunting, reduced seed set) can occur if the chemical is applied at any time other than the recommended stage. DO NOT apply to crop under stress from adverse environmental conditions, such as excess moisture, drought and disease. Apply when air temperature is between 10 and 25°C.

DO NOT apply:
- when there is a risk of severe temperature fall in the night;
- under high humidity, temperatures above 30°C, or fog conditions, to prevent drift to sensitive crops;
- when wind is blowing toward a nearby sensitive crop;
- when winds are gusty up to 5 mph (8 km/hr).

Tank Mixes:

Herbicides:

	Spring wheat	Winter wheat	Barley	Oats	Seedling grasses
2,4-D Amine (500g ai/L) (0.34 L/acre)	✓	✓	✓		✓
MCPA Amine (0.34 L/acre)	✓	✓	✓	✓	✓
MCPA K (0.44 L/acre)	✓	✓	✓	✓	✓
Sencor (0.11 to 0.17 L/acre)	✓		✓		
Ally (2 g/acre)	✓		✓		

In Canaryseed: *MCPA* amine (0.34 L/acre - 500 g ai/L formulation)

In Corn, Spring rye: *2,4-D amine* (0.34 L/acre - 500 g ai/L formulation)

In Corn (Banvel II only):

Accent (13.5 g/acre) plus non-ionic surfactant

Option 35DF (40 g/acre) plus *Hasten* adjuvant plus liquid 28-0-0 (*Banvel II* at 0.12 L/acre) (Manitoba only).

Option 2.25 OD (0.63 L/acre) plus liquid 28-0-0 (*Banvel II* at 0.12 L/acre) (Manitoba only).

In Chemical fallow, stubble: *2,4-D*, glyphosate products.

In Red fescue: *2,4-D* amine (0.61 L/acre - 500 g ai/L formulation)

In Preseeding burnoff: Glyphosate (0.38 L/acre - 360 g ai/L formulation)

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the dicamba labels only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Re-entry: DO NOT enter treated fields for 12 hours.

Grazing and Harvest Intervals:

Canaryseed: Use only as birdseed.

Corn: DO NOT graze cattle or harvest for silage until 7 days after treatment of dicamba alone or for at least 12 weeks following dicamba tank mixes with other herbicides.

Cereals, seedling grasses, pasture: DO NOT harvest for silage for or graze lactating dairy cattle until 7 days after treatment. If treated vegetation has been consumed by dry dairy animals or meat animals within 30 days of dicamba application, feed the animal with untreated diet for 30 days before slaughter. Meat animals or dry dairy animals may graze or feed on treated pasture 3 days after dicamba application without restrictions on slaughter. Feed untreated forage within 3 days of slaughter.

Re-cropping: Grow only cereals, corn, soybeans or white beans the year after treatment with the 1.0 L per acre rate. Grow only cereals, corn, field beans, soybeans or canola the year after applications of 0.5 L per acre. If applications are made after September 1, or if dry weather persists after application, crop injury may occur the following spring.

Aerial Application: May be applied by air on cereals only. Use a minimum water volume of 8 L per acre.

Storage: May be stored at freezing temperatures.

Buffer Zones:

Application method	CROP	Buffer Zones (metres†) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Ground*	Barley, oats, rye, wheat, canary seed, seedling forage grasses	0	0	1
	Corn, established forage grasses, red fescue	1	1	4
	Stubble, fallow	1	1	5
	Pasture and rangeland	1	1	10
Winged airplane	Barley, oats, rye, wheat,	0	0	50
Helicopter		0	0	45

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Buffers are not required for handheld and backpack applications.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Caution –Poison

Warning – Eye Irritant

For an explanation of the symbols used here see page 11.

Dicamba/Mecoprop/ MCPA

Herbicide Group
4 - dicamba, mecoprop-p & MCPA
(Refer to page 38)

Company:

Syngenta (*Target* – PCP#28028)
United Agri Products (*Sword* – PCP#27892)
IPCO (*Tracker XP* – PCP#27790)

Formulation:

275 g/L MCPA + 62.5 g/L mecoprop-p + 62.5 g/L dicamba formulated as a solution.

Container size - 2x10 L and 160 L (*Target*), 500 L (*Sword*), 1000 L (*Sword*).

Crops and Staging:

All Products:
Cereals:

CROP	STAGE
Barley	2 to 4 leaf (3 leaf for best crop safety)
Canaryseed, Oats, Spring wheat (including durum)	2 to 5 leaf (3 to 4 leaf for best crop safety)
Winter wheat	Spring application only; up to 12 inches (30 cm) high (top leaf extended)
Summerfallow	Fall stubble

***Target* and *Sword* only:**
Seedling grasses grown for forage only (NOT for seed production)*:
Apply at the 2 to 4 leaf stage.

Creeping red fescue
Crested wheatgrass
Intermediate wheatgrass
Meadow foxtail
Orchardgrass
Smooth bromegrass
Timothy

Established grasses for forage only (NOT for seed production):*
Apply up to flag leaf stage.

Bromegrass (meadow, smooth)
Fescue (creeping red, meadow, tall)
Kentucky bluegrass
Meadow foxtail
Orchardgrass
Timothy
Wheatgrass (crested, intermediate, pubescent, slender, streambank, tall, western)

** NOTE: Use only one application per year by ground. Since applications to forage grasses in western Canada has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance.* ***Application to forage grasses are at the risk of the user.***

Weeds and Staging:

Weeds controlled at the 2 to 3 leaf stage unless otherwise indicated:

Annual sow-thistle
Ball mustard
Canada thistle (6 to 8 inches (15 to 20 cm) and actively growing)*
Cleavers (1 to 2 whorls)
Common ragweed
Corn spurry
Cow cockle
Field bindweed*
Flixweed
Green smartweed (including lady's-thumb)
Hedge bindweed*
Hemp-nettle (less than 2 pairs of true leaves)
Knotweed
Kochia
Lamb's-quarters
Night-flowering catchfly
Perennial sow-thistle*
Prostrate pigweed
Redroot pigweed
Russian thistle (less than 2 inches-5 cm)
Shepherd's-purse
Stinkweed
Tall mustard
Tartary buckwheat
Volunteer buckwheat
Volunteer canola
Volunteer sunflowers
Wild buckwheat
Wild mustard
Wormseed mustard
Yellow mustard

* Top Growth Control only

Rates:

0.4 to 0.6 L per acre (10 L treats 25 to 16.7 acres).

Use the higher rate under adverse weather conditions, when weed density is high, for cleavers control, winter annual control and for suppression of Canada thistle and perennial sow-thistle.

Although *dicamba/mecoprop-p/MCPA* is registered up to the 5 leaf stage of the crop for the rates listed here, the low rate should be used when the crop is at the 5 leaf stage for optimum crop safety.

For Canada thistle, post-harvest or summerfallow application, use 0.81 L per acre (one 10 L container treats 12.4 acres).

Application Information:

Water Volume:

Ground: Minimum 40 L per acre.

Aerial: Minimum of 12 L per acre

Nozzles and Pressure: 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE coarse*** droplets. Use a 50 mesh or coarser screen and filter system.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Hot and dry or cold and wet weather prior to spraying may result in reduced weed control and increased crop injury. Do not apply within 2 weeks of a killing frost.

Tank Mixes:

Herbicides:

Spring wheat (including durum):

Horizon 240EC plus Score adjuvant.

Horizon NG **(label rates - no adjuvant required)

Spring wheat (NOT including durum):

*Everest 70 WDG**

Wheat and Barley:

Sencor or *linuron* for chickweed control.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

* May be tank-mixed with *Sword* only. A reduction in wild oat control may be observed with the tank-mix.

** For mixing with Target only.

Note: The above mixes are those listed on the *dicamba / mecoprop-p/MCPA* labels only. To check for other possible mixes see the blue chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Activity may be reduced if rainfall occurs within 3 hours of application. Contact manufacturer for more information.

Re-entry: DO NOT enter treated fields for 12 hours.

Grazing: DO NOT graze or harvest for livestock feed within 7 days of application.

Preharvest: Leave at least 80 days from application to harvest.

Re-cropping: No restrictions the year after application.

Aerial Application: All may be applied by air.

Storage: DO NOT freeze.

Buffer Zones:

Application method	Crops	Buffer Zones (metres†) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Ground *	Standing Crops	1	1	5
	Fallow and stubble	1	1	5
Fixed wing airplane	Cereals	1	0	60
	Canaryseed	1	0	75
	Forage	1	0	75
	Fallow and stubble	5	1	100
Helicopter	Cereals	1	0	50
	Canaryseed	1	0	60
	Forage	1	0	60
	Fallow and stubble	4	1	80

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Buffers are not required for handheld and backpack applications.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Caution – Poison

Warning – Eye Irritant
Potential Skin Sensitizer

For an explanation of the symbols used here see page 11.

Dichlorprop/2,4-D

Herbicide Group
4 - dichlorprop & 2,4-D
(Refer to page 38)

Company/Products:

United Agri Products (*Turboprop*)
Nufarm Agriculture (*Estaprop Plus; Estaprop XT*)
IPCO, Viterra (*Dichlorprop-D*)
IPCO (*Dichlorprop-DX*)

Formulation:

***Turboprop* (PCP#27967); *Estaprop Plus* (PCP#27968); *Dichlorprop-D* (PCP#27966):** 300 g/L of dichlorprop and 282 g/L of 2,4-D ester formulated as an emulsifiable concentrate.

***Estaprop XT* (PCP#29660); *Dichlorprop-DX* (PCP#29664):** 210 g/L of dichlorprop-P* and 400 g/L of 2,4-D ester formulated as an emulsifiable concentrate.

* NOTE: dichlorprop-P is a more active version of dichlorprop.

Container sizes:

Turboprop, Dichlorprop-D: 2 x 10 L, 115 L

Estaprop Plus: 2 x 10.6 L, 114 L and 450 L

Estaprop XT: 2 x 9.7 L, 97.1 L

Dichlorprop-DX: 2 x 10L

Crops and Staging:

Wheat (spring, durum) and barley - 4 leaf until prior to the emergence of the flag leaf.

Winter wheat - in spring after the initiation of tillering but prior to the emergence of the flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Rates:

Turboprop; Estaprop Plus; Dichlorprop-D: 0.71 L per acre
One 10 L container treats 14 acres
One 10.6 L container treats 15 acres

***Estaprop XT* (PCP#29660); *Dichlorprop-DX* (PCP#29664):** 486 mL per acre.
One jug treats 20 acres

How it Works:

Refer to Table 2 on page 36.

Weeds and Staging:

Treat weeds when young and actively growing and before they are shielded by the crop. Additional stage restrictions are indicated.

Annual sow-thistle
Ball mustard
Bluebur
Burdock
Canada thistle*
Cocklebur
Curled dock*
Dandelion ***
Dog mustard
Flixweed
Hare's-ear mustard
Indian mustard
Kochia◊◊◊
Lady's-thumb◊◊
Lamb's-quarters
Night-flowering catchfly◊
Oak-leaved goosefoot
Perennial sow-thistle*
Prickly lettuce (2 to 12 leaf)†
Ragweed
Redroot pigweed
Round-leaved mallow
Russian pigweed
Russian thistle◊◊◊
Shepherd's-purse
Smartweed◊◊
Stinkweed
Stork's-bill
Tartary buckwheat◊◊
Toadflax**
Tumble mustard
Volunteer canola◊◊
Volunteer sunflower◊◊
Wild buckwheat◊◊
Wild mustard
Wormseed mustard

*	Top growth control only
**	Suppression only. Treat before the majority reach 6 inches (15 cm).
***	*Estaprop (Plus, XT)* and *Dichloroprop-D* only – season long control in winter wheat.
◊	Spring annuals only
◊◊	Treat prior to the 4 leaf stage
◊◊◊	Treat up to 2 inches (5 cm)
†	*Estaprop Plus or XT* and *Dichloroprop-D* only in winter wheat.

Application Information:

Water Volume:
Ground: 20 to 97 L per acre*. Use a minimum of 40 L of water per ac[illegible] to reduce the risk of drift.
Aerial: Minimum 12 L per acre.

Nozzles and Pressure: 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver proper coverage with ***ASABE coarse*** droplets or larger.

* May vary by product. Check label closely.

Effects of Growing Conditions:

Applications made under dry conditions may result in reduced control. Crops under stress from adverse environmental conditions, such as excess moisture, frost or drought, may be injured. Best weed control when adequate soil moisture is present and warm temperatures prevail. DO NOT apply when daytime temperatures exceed 27°C.

Tank Mixes:

Herbicides: *Estaprop (Plus, XT) Dichlorprop DX and Turboprop only*

Tank Mix Partner (Mixed at label rates unless otherwise indicated)	CROPS			
	Spring wheat	Durum	Winter wheat	Barley
*Avenge**	•		•	•
*Imazamethabenz*Δ	•	•		
*Clodinafop*Δ	•	•		
*Fenoxaprop*Δ	•	•		•†
Flucarbazone 70WDG Δ†††	•			
*Thifensulfuron/ tribenuron*Δ††	•	•	•	•
Tralkoxydim Δ	•	•	•	•

* Refer to *Avenge* label for a list of tolerant wheat varieties.

† *Puma*^{120} *Super, Cordon,* and *WildCat* only.

†† *Estaprop Plus* and *Estaprop XT* only.

††† *Estaprop Plus, Estaprop XT*, and *Dichlorprop DX* only.

Δ Manufacturers may only support mixes with specific products. Contact the manufacturer for more information.

Note: Always refer to the label or the page for the tank mix partner in this guide for additional restrictions on staging and varieties.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on *dichlorprop+2,4-D/dichlorprop-P+2,4-D* labels only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Re-entry: Leave 12 hours before entering treated fields.

Grazing: DO NOT graze the treated crop or harvest for hay or feed within 40 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.

Preharvest Interval: Leave 40 days from spraying until harvest of winter wheat and 60 days for other crops.

Re-cropping: No restrictions the year after application. Fields treated with *Estaprop XT* may be replanted after a minimum of 30 days.

Aerial Application: May be applied by air. Refer to specific product labels for full details for application by air.

Storage: May be frozen.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat**
	Less than 1 m	Greater than 1 m	
Ground	1	1	1
Fixed wing aircraft	10 (5††)	1	45 (30††)
Helicopter	10 (3††)	1	40 (30††)

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

** Handheld or backpack sprayers do not require a buffer zone.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

†† *Dichlorprop - DX* and *Estaprop XT*.

Tank Cleaning:

Manufacturers of this product warn that even after thorough cleaning, the use of a sprayer that has come in contact with this product may cause damage to susceptible crops.

DO NOT use spray equipment to apply other pesticides to crops sensitive to these products. To clean sprayer, rinse all parts several times with water, then fill sprayer with a water/ammonia solution (1 L of a 3% household ammonia solution per 100 L of water) and let stand for 24 hours. Rinse several times after with clean water.

DO NOT clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

◈ Warning – Poison

◇ Warning – Skin Irritant (*Turboprop*)

▽ Caution – Skin Irritant (*Dichloroprop-D*)

For an explanation of the symbols used here see page 11.

Diquat

Herbicide Group
22 - diquat
(Refer to page 38)

Company:

Syngenta Canada (*Reglone* - PCP#26396; *Desica* - PCP#30488)

Formulation:

240 g/L diquat formulated as a solution.
Container size - 2x10 and 115 L.

Crops and Staging:

Diquat is used to dry immature green material at top of indeterminate crops and green weeds to facilitate harvest. *Diquat* will not speed maturity of green crops. Treatment before the recommended stage can result in reduced yield and quality. Add 0.1 L of *Agral 90* or *Agsurf* per 100 L of spray solution for all applications except those indicated.

CROP	STAGE	RATE (L/ACRE)	
		Ground	**Aerial**
Dry beans, soybeans	Crop has lost 80 to 90 percent of leaves and 80 percent of pods are yellow.	0.5 to 0.7 (use high rate for dense crop, heavy weed infestations)	0.7 to 0.9 (use high rate for dense crop, heavy weed infestations)
Faba beans	Most plants are ripe and dry. Pods fully filled, bottom pods are tan or black in colour.		
Flax, solin	75 percent of bolls brown		
Lentils	Lowest pods are light brown and rattle when shaken.		
Mustard (condiment type only)	75 percent of seed has turned brown		
Canola*	80-90 percent of seed has turned brown.		
Peas	Bottom pods are ripe and dry, seeds detached from pods.		
Chickpeas◊	Plants yellow, pods mature, seeds changed colour and detached from pods.		
Sunflowers	Backs of sunflower heads and bracts are turning yellow and seed moisture is 20 to 50 percent.		
Potatoes (some top growth and/or some weeds)	Two weeks prior to harvest	0.7 to 0.9**	2 applications required. First application – 0.7 to 0.9 L/acre** Second application (4 to 5 days later) at 0.5 L/acre
Potatoes (dense crop, heavy weed infestations)		1.4**	
Alfalfa, bird's -foot trefoil, red and white clover (for seed production only)***	Pods are ripe but before shattering. Harvest within 7 days.	0.7 to 1.1 (use high rates for dense crops, heavy weed infestations)	0.7 to 1.1 (use high rates for dense crops, heavy weed infestations)

* This product can cause shattering losses in canola. It should only be used on *B. napus* canola to assist in the harvest of a severely lodged crop.

** Use high rate for dense or immature vines.

*** DO NOT use on forage legumes that have been treated with a residual herbicide in the previous 12 months.

◊ Aerial applications to chickpea - 0.7 L per acre only.

Application Information:

Water Volumes:
Ground applications: 91 to 222 L per acre. Use 222 to 445 L per acre on potatoes.
Aerial applications: 18 L per acre.
Use the highest water volumes when crop canopy is heavy or if weed growth is dense.

Nozzles and Pressure: 30 to 40 psi (210 to 275 kPa) when using conventional Flat fan nozzle tips are recommended for proper coverage. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Best results under cloudy conditions or in evening. Shattering losses can increase if heavy winds, rain or hail occur after the crop has dried down.

Tank Mixes:

Herbicides: None registered.

Insecticides: None registered.

Fungicides: Fungicides may be added when applying *diquat* to potatoes for vine killing.

Fertilizers: None registered.

Restrictions:

Rainfall: Within 15 minutes may reduce effectiveness.

Re-entry: Leave 24 hours before entering treated fields.

Grazing: Crop residues remaining after harvest may be fed to livestock.

Preharvest Interval: Wait 4 to 7 days before harvesting faba bean and lentil. DO NOT exceed 7 days to harvest when treating forage legumes. Wait at least 7 days before harvesting lupins. Wait 7 to 10 days before combining canola and mustard, but do not wait longer than 14 days. Wait 15 to 20 days for sunflowers. Harvest flax and peas when sample tests dry.

Re-cropping: No restrictions the year after application.

Aerial Application: May be applied by air in a minimum of 18 L per acre water volume.

Storage: DO NOT freeze.

Buffer Zones:

Application method	Crops	Buffer Zones (metres†) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Ground	Potatoes	10	5	5
	Other crops under **Crops:** section	5	3	3
Winged aircraft	Potatoes	200	100	100
	Beans, Legume forage seed	150	80	90
Helicopter	Potatoes	125	65	80
	Beans, Legume forage seed	100	55	70

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones for ground applications can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

When finished spraying *diquat*, rinse the sprayer out with clean water. Run through pump, lines and nozzles. Drain tank by spraying out on an untreated portion of a crop on which the product is registered, or by spraying on uncropped land. Refill sprayer with water and *Agral 90*, or *Agsurf* at 0.6 L per 1,000 L spray solution. Run the solution through lines and boom. Spray out, then refill with clean water. Leave equipment standing overnight, then drain water out.

Refer to page 14 for additional information.

Hazard Rating:

☠ Warning – Poison

▽ Caution – May cause eye damage

Potential Skin Sensitizer

For an explanation of the symbols used here see page 11.

Distinct

Herbicide Group
4 - dicamba
19 - diflufenzopyr
(Refer to page 38)

Company:

BASF Canada (PCP#25811)

Formulation:

One case of *Distinct* contains:

Distinct (PCP#): 20% diflufenzopyr and 50% dicamba, sodium salt formulated as a water dispersible granule. Container size: 2 x 2.3 kg.

Crops and Staging:

Chemfallow and Post Harvest applications

Weeds, Rates and Staging:

Distinct must be tank-mixed with glyphosate and Merge adjuvant must be added at 200mL per acre.

***Distinct* at 58 g per acre (40 acres per jug) controls:**

Kochia
Dandelion*

***Distinct* at 114g per acre (20 acres per jug) controls:**
Weeds listed above plus:

Canada Thistle*
Common Cocklebur
Common Ragweed
Lady's Thumb
Lamb's Quarters
Redroot Pigweed
Tall Waterhemp
Velvet Leaf
Wild Buckwheat

*Top growth control only.

A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 20 - 40 L per acre. High water volumes are required for adequate coverage, particularly when weed densities are high or weed staging is large.

Nozzles and Pressure: Use 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage a of ***ASABE medium*** droplets. Use 50 mesh (or coarser) filter screens.

Effects of Growing Conditions:

DO NOT spray if temperatures of +5°C are forecast within 3 days of application. Under cool or dry conditions, control of some weeds may be severely reduced.

Tank Mixes:

Glyphosate (0.5 to 1.0L per acre of 360 g/L formulation.)

Restrictions:

Rainfall: Rain within 3 hours may reduce control.

Re-entry: Leave 12 hours before entering treated fields.

Grazing: DO NOT graze or cut for 75 days.

Re-cropping: A plant back interval of 30 days is required for the planting of rotational crops. Consult BASF for further information on rotational cropping.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool, dry place above 5°C.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only	15	15	10

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

DISTINCT can cause injury to sensitive crops at very low concentrations. Sprayers used to spray this product should be flushed out immediately after use.

1 Drain tank and flush tank, boom and hoses with clean water.

2. Visually inspect tank to ensure removal of all visible herbicide residues. If necessary, repeat Step 1.
3. Fill the tank with clean water, and then add a detergent tank cleaner at the recommended rate. Agitate for 15 minutes ensuring the cleaning solution comes in contact with interior surfaces. Flush the boom and hoses with the cleaning solution and drain the sprayer.
4. Remove nozzles and screens and clean separately with a detergent cleaning solution.
5. Rinse the tank with clean water and flush through the booms and hoses using at least on tenth of the spray tank volume. Drain tank completely.

Hazard Rating:

☠ Warning – Poison

For an explanation of the symbols used here see page 11.

Dual II Magnum

Herbicide Group
15 - metolachlor
(Refer to page 38)

Company:

Syngenta Canada (PCP#25729)

Formulation:

915 g/L s-metolachlor formulated as an emulsifiable concentrate. Container size - 12 L.

Crops and Staging:

Pre-plant incorporated. In areas with good rainfall or under irrigation, *Dual II Magnum* may be applied as a pre-emergence surface treatment. When applied to the soil surface, after planting but prior to emergence, at least 0.5 inches of water (1.25 cm) is required within 10 days of application for proper activity. Refer to product label for more specific information on timing and rates of applications for each crop type.

Corn (field, sweet, silage)
Dry beans (white, kidney, and pinto)*
Potatoes
Soybeans
Sweet white lupins

* Beans should be planted at least 4 cm deep to avoid crop injury. Dry bean varieties vary in their tolerance to *Dual II Magnum*. Test a limited acreage on all new varieties first.

Weeds and Staging:

Pre-emergent and Pre-Plant Incorporated Treatments: Apply prior to weed emergence.

American nightshade
Barnyard grass
Eastern black nightshade
Green foxtail
Old witch grass
Redroot pigweed*
Yellow foxtail
Yellow nutsedge**

* Suppression only.

** Pre-plant incorporated treatment only.

Rates:

0.47 to 0.7 L per acre (12 L treats 24 to 17 acres).

Use higher rates on heavy textured soils or when high populations of weeds are expected.

DO NOT apply to soils with less than 1% or more than 10% organic matter.

Make only one application per season.

Refer to product label for more specific information on timing and rates of applications for each crop type.

Application Information:

Water Volume: A minimum of 60 L per acre.

Pressure: 30 to 45 psi (200 to 300 kPa).

Nozzles: Use flat fan nozzles, 50 mesh screens.

Incorporation:

Apply to a firm seed bed free of large clods or lumps. If using tandem disks, set disks to work the soil at a depth of 4 inches (10 cm) and operate at a speed of 6 km/hr (4 mph). If using an S-tine cultivator, set the implement to work the soil to a depth of 4 inches (10 cm) and operate at a speed of 10 km/hr (6 mph). Incorporation equipment should include rolling or western harrows.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

A moderate rainfall or equivalent irrigation is required within 10 days to activate pre-emergent surface treatments. If rain does not occur, a shallow cultivation or use of a rotary hoe is necessary. Drought conditions that persist after any application may reduce annual grass control. On sandy soils, heavy rainfall following application may cause leaching of *Dual II Magnum*, resulting in reduced weed control.

Tank Mixes:

Herbicides:

In Corn: *AAtrex* in both PPI and pre-emergent applications.

In Soybeans: *Sencor*, and *glyphosate*, in both PPI and pre-emergent applications.

Fertilizers: May be applied with liquid fertilizer. May be impregnated onto dry bulk fertilizers (except nitrate fertilizers, superphosphate fertilizers or limestone).

Insecticides: None registered.

Note: The above mixes are those listed on the *Dual II Magnum* label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: When applying as a pre-emergent surface treatment, 0.5 inches (1.25 cm) of rain or irrigation is required after application for proper activity.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze the treated immature crop or cut for hay. In corn, immature means before ear emergence.

Preharvest Interval: DO NOT harvest Corn within 80 days of post-emergent application.

Re-cropping: In the year of treatment, seed only corn, soybeans, white beans, potatoes, snap beans, lima beans, processing peas, sweet white lupins, or (a minimum of 4.5 months after application) winter cereals. If *Dual II Magnum* has been applied in a tank mix with another product, consult those products' labels for additional recropping restrictions.

Aerial Application: DO NOT apply by air.

Storage: May be frozen.

Buffer Zones: Leave a buffer zone of 29 meters between last spray swath and the edge of important wildlife habitats such as wetlands, sloughs and water bodies.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

◇ Warning – Eye Irritant

▽ Potential Skin Sensitizer

For an explanation of the symbols used here see page 11.

DyVel

Herbicide Group
4 - dicamba & MCPA
(Refer to page 38)

Company:

BASF Canada (PCP#16545)

Formulation:

84 g/L of dicamba and 336 g/L of MCPA K+ formulated as a solution.

Container size - 10 L, 55 L, 110 L, 1000 L

Crops and Staging:

Spring wheat (including durum), barley or oats - 2 to 5 leaf stage.

Winter wheat - apply in spring when crop is 6 to 10 inches (15 to 25 cm) tall but before shot blade stage.

Note: Crop damage can occur if applications are made at other than the recommended crop stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Weeds controlled in the 2 to 4 leaf stage unless otherwise stated:

Ball mustard
Burdock
Cleavers (suppression only)
Cocklebur
Corn spurry (2 to 3 leaf)
Cow cockle (2 to 3 leaf)
Flixweed
Green smartweed (Lady's-thumb)
Hemp-nettle (2 to 3 leaf)
Kochia
Lamb's-quarters
Mustards (Hare's ear, Indian, Tumble, Wild, Wormseed)
Kochia
Pigweed (Prostrate, Redroot, Russian)
Ragweed (Common, False, Giant)
Russian thistle
Shepherd's-purse
Stinkweed
Tartary buckwheat
Wild buckwheat
Wild radish
Volunteer canola (2 to 4 leaf)
Volunteer sunflowers

Top growth control:

Canada thistle
Perennial sow-thistle

Rate:

0.51 L per acre (one 10 L jug treats 19.7 acres).

Application Information:

Water Volume:
Ground: 40 L per acre.
Aerial: Minimum 8 L per acre

Nozzles and Pressure: Maximum 40 to 45 psi (275 to 310 kPa) when using conventional flat fan nozzles. To reduce the risk of drift damage to sensitive non-target crops when using conventional nozzles, 20 to 30 psi (150 to 200 kPa) as well as higher water volumes are recommended. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE coarse*** droplets.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

For best weed control, apply when temperature is between 10 and 25°C. DO NOT treat crops under stress from excessive moisture or drought. To avoid crop injury, DO NOT apply when temperature is expected to exceed 30°C, or when there is a risk of a severe drop in overnight temperature.

Tank Mixes:

Herbicides:
In Spring wheat:
Horizon 240EC (93 to 117 mL/acre)) plus ***Score*** adjuvant.
Everest 70WDG – (17.4 g/acre) plus non-ionic surfactant.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *DyVel* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Avoid applying this product when heavy rain is forecast. Contact manufacturer for more information.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze treated crop or cut for hay within 30 days of application.

Preharvest Interval: Leave 60 days between application and harvest.

Re-cropping: No restrictions the year after treatment.

Aerial Application: May be applied by air.

Storage: May be frozen.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	4
Fixed wing aircraft	1	0	60
Helicopter	1	0	50

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

▽ Caution – Poison

For an explanation of the symbols used here see page 11.

DyVel DSp

Herbicide Group
4 - dicamba, 2,4-D & mecoprop
(Refer to page 38)

Company:

BASF Canada (PCP#27856)

Formulation:

110 g/L dicamba, 295 g/L 2,4-D amine and 80 g/L mecoprop-p formulated as a solution.

Container size - 10 L , 55L, 100 L.

Crops, Rates and Staging:

CROP	STAGE	RATE	
		(L PER ACRE)	ACRES PER 10L JUG
Spring wheat (including durum)	3 to 5 leaf	0.34 to 0.45	29 to 22
Barley	2 to 3 leaf	0.34	29
Winter wheat	Before crop is 12 inches (30 cm) tall in spring	0.34 to 0.45	29 to 22
Corn (field)** (DO NOT apply to sweet corn)	Before corn reaches 6 inches (15 cm) in height with the top leaf extended or by directed spray with drop nozzles once over 12 inches (30 cm).	0.34 to 0.45	29 to 22
Native range and permanent grass pasture*	Established	1.3	7.7
Fall stubble, summerfallow	Stage according to weed	0.45 to 0.71	22 to 14

* Legumes will be severely injured by this application.

** NOTE: Under environmental stress corn will become brittle for 2 weeks after application. In-field mechanical processes and strong winds may cause stalk lodging during that time.

Applications outside the recommended stage may result in crop injury.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

The low registered rate for each crop will control the following weeds at the 2 to 3 leaf stage unless otherwise indicated:

Annual smartweed (including lady's-thumb)
Annual sow-thistle
Cocklebur
Common ragweed
Corn spurry
Hedge bindweed
Knotweed
Kochia
Lamb's-quarters
Mustards (wild, ball, tall, wormseed, yellow)
Pigweed (prostrate, redroot)
Russian thistle
Stinkweed*
Volunteer canola (2 to 4 leaf, prior to bolting)
Volunteer tame buckwheat
Wild buckwheat

Use the high registered rate for each crop to control the following weeds:

Canada thistle (top growth only)***
Cleavers (1 to 2 whorls)**
Cow cockle
Field bindweed†
Velvetleaf
Flixweed*
Jerusalem artichoke
Round-leaved mallow**
Shepherd's-purse*
Tartary buckwheat

† Apply when actively flowering.

* Rosette stage in winter wheat.

** Suppression only.

*** Canada thistle should be treated when 6 to 8 inches (15 to 20 cm) of new growth is present in Fall Stubble and in the early bud stage in Summerfallow.

Rates for Native Range and Pasture will control:

Alder
Bull thistle
Chicory
Goat's-beard
Poison ivy
Ragwort
Sheep laurel
White cockle

The high rate for each crop should be used for all weeds under adverse growing conditions, when weeds are at an advanced stage of growth or when weed densities are high. Guidelines are not provided for weed densities under light or heavy infestations. When in doubt as to the infestation level, use the high rate or contact the manufacturer.

NOTE: It is possible that poisonous plants such as ragworts, hemlocks and death camas could be more palatable to livestock after treatment with DyVel DSp. *Suitable precautions should be taken to avoid livestock access when such plants are present.*

Application Information:

Water Volume:
Cereals: Minimum 40 L per acre.
Corn: 81 to 142 L per acre.

Nozzles and Pressure: Maximum 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE coarse*** classification or larger droplets.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Crops under stress from excess moisture, drought or disease may suffer a setback when this herbicide is applied. DO NOT apply when temperature exceeds 27°C or when relative humidity is high. Stubble treatments for thistle control in fall should be made at least 2 weeks prior to killing frost.

DO NOT apply *DyVel DSp* at wind speed greater than 5 mph (8 km/hr).

Tank Mixes:

Herbicides:
In corn:
AAtrex Liquid (0.91 L/acre).
In spring wheat (NOT including durum):
Everest 70WDG (17.4 g/acre) plus non-ionic surfactant.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *DyVel DSp* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information. DO NOT irrigate for 24 hours after application.

Re-entry: DO NOT enter fields for at least 12 hours for field corn and leave 14-days from application to hand harvest sweet corn .

Grazing: DO NOT harvest for livestock feed within 30 days of application. DO NOT permit lactating dairy animals to graze fields within 7 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.

Pre-harvest Interval: Leave 30 days between application and harvest.

Re-cropping: No restrictions the year after treatment.

Aerial Application: DO NOT apply by air.

Storage: May be frozen.

Buffer Zones: If there are sensitive plants within 400 m, apply only when there is a light breeze away from the sensitive area. DO NOT contaminate wetlands or water used for domestic or livestock consumption, irrigation or natural habitat.

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Cropland	1	1	5
Range and Pasture	1	1	10

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Handheld or backpack sprayers do not require a buffer zone.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Warning – Poison

⚠ Warning – contains the allergen soy

For an explanation of the symbols used here see page 11.

Eclipse III

Herbicide Group
4 - clopyralid
9 - glyphosate
(Refer to page 38)

This product is a prepackaged tank mix of *Eclipse III A* (*Lontrel* page 210) and *Eclipse III B* (*Vantage Plus Max II* pages 174). Information listed is restricted to Crop, Weeds and Rates. For other detailed information on the component products see the product pages listed above.

Company:

Dow AgroSciences

Formulation:

***Eclipse III A* (PCP#29032):** 360 g/L clopyralid formulated as a solution.

***Eclipse III B* (PCP#29033):** 480 g/L glyphosate present as an dimethylamine (DMA) salt and formulated as a solution.

Container size -
Eclipse III A: 4.45 L jug
Eclipse III B: 2 x 7.5 L jugs

Crops and Staging:

Glyphosate tolerant canola varieties only in the 2 to 6 leaf stage. Some yellowing may occur when applied at the 4 to 6 leaf stage. This effect is temporary and will not influence crop growth, maturity or yield.

Weeds and Staging:

No staging is specified on the label.

The weeds controlled by glyphosate at 180 g ae per acre plus:

Annual broadleaf weeds:

Chickweed
Corn spurry
Cow cockle
Kochia
Night-flowering catchfly
Shepherd's-purse
Smartweed
Wild tomato
Volunteer canola*

Perennial weeds (season long control):

Canada thistle
Dandelion less than 15 cm diameter**
Dandelion greater than 15 cm diameter***
Perennial sow-thistle**
Quackgrass

* Not including glyphosate tolerant (Roundup Ready) varieties.
** Top growth only.
*** Suppression only.

Rates:

Eclipse III A: at 112 mL per acre

Eclipse III B: at 375 mL per acre

One case treats 40 acres.

To prepare spray solution, add *Eclipse III A* to the spray tank. Once it is half filled with water, add *Eclipse III B* as the remaining water is added to the tank.

Application Information:

Water Volume: 40 L per acre.

Nozzles and Pressure: Maximum 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift. DO NOT use with galvanized sprayer tanks since explosive hydrogen gas can be produced.

Restrictions:

Re-cropping: Wheat, oats, barley, rye (not underseeded to legumes such as alfalfa and clover), forage grasses, flax, canola, mustard and field peas* can be grown the year after application. Apply manure bedded with straw from treated crops only to the crops listed above excluding field peas.

**DO NOT seed to field peas for at least 10 months following treatment. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application delay seeding field peas an additional 12 months (22 months following application). Contact your local Dow AgroSciences representative or retailer for more information before seeding field peas following drought conditions in the previous year.*

Aerial application: DO NOT apply by air.

Edge Granular

Herbicide Group
3 - ethalfluralin
(Refer to page 38)

Company:

Dow AgroSciences (PCP#20980)

Formulation:

5% ethalfluralin formulated as a granular.
Container size - 25 kg or 544 kg.

Crops and Staging:

Edge can be applied prior to seeding the following crops:

Seedling alfalfa (seed production only)
Canola
Caraway
Coriander
Dry beans (white or kidney)
Fababeans
Lentils (fall application only)†
Mustard (yellow only)
Peas
Safflower
Soybeans
Sunflowers

† See special instructions for lentils section below

Weeds and Staging:

For pre-emergent control of the following weeds:

Grasses:

Barnyard grass
Crabgrass
Foxtail (green & yellow)
Volunteer barley*
Volunteer spring wheat*
Wild oat*

Broadleaf Weeds:

Cleavers*
Chickweed
Corn spurry
Cow cockle
Hemp-nettle*
Kochia
Lady's-thumb*
Lamb's-quarters
Nightshade*
Prostrate pigweed
Purslane
Redroot pigweed
Russian thistle*
Wild buckwheat

* Suppression only.

Rates:

	RATE (KG PER ACRE)				
	LIGHT TEXTURED SOILS		MEDIUM TO HEAVY TEXTURED SOILS		
TIME OF APPLICATION	2-6% Organic Matter/Dark Brown-Black	6-15% Organic Matter Deep Black	2-4% Organic Matter Dark Brown	4-6% Organic Matter Black	6-15% Organic Matter Deep Black
Spring	6.9	8.9	6.9	8.9	8.9 - 11.3
Fall *	8.9	11.3	8.9	11.3	11.3

* To conserve crop residue, one incorporation may be completed in the fall and the second incorporation completed in the spring prior to planting.

DO NOT apply to peat soils, mineral soils containing less than 2 percent organic matter or soils containing greater than 15 percent organic matter. Application to eroded knolls or grey-wooded soils with highly variable texture or organic matter may result in reduced crop stand, delayed development or reduced yields in either the treated or rotational crop.

To reduce the possibility of injury to the treated crop, use good quality certified seed. Seed shallow into a warm, moist, firm seedbed using recommended agronomic practices that will promote rapid and even crop germination and emergence.

† Special instructions for lentils:

Registered for use on lentils for fall application only. One incorporation must be completed in the fall. Seeding depth is critical - DO NOT seed more than 1.5 inches (4 cm) deep. Avoid loose seedbeds and planting into cold soils.

Application Information:

Equipment: Apply using a calibrated granular applicator.

Incorporation: Two incorporations are required at right angles for thorough mixing. The first incorporation must be completed within 24 hours of application. Delay the second incorporation for at least three days after the first. When applying *Edge* in the fall, it is preferred that both incorporations be done in the fall. The second incorporation may be delayed until spring to conserve trash; however, both incorporations must be done to the same depth.

Incorporate with a tandem disc, discer or field cultivator (Vibrashank type). Cultivators should have 3 to 4 rows of sweeps spaced 8 inches apart and staggered so that no soil is left unturned. Set equipment to work at a depth of 3 to 4 inches (8 to 10 cm). Operate disc implements at 4 to 6 mph (7 to 10 km/hr), cultivators at 6 to 8 mph (10 to 13 km/hr).

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Crops stressed by cold weather, excessive moisture or drought may be injured by *Edge*. Dry soil conditions between application and emergence may result in decreased weed control.

Tank Mixes:

Not applicable.

Restrictions:

Rainfall: No effect once incorporated.

Grazing: DO NOT graze or cut treated crops for livestock feed prior to crop maturity.

Re-cropping: DO NOT grow sugar beets, oats, and small-seeded annual grasses such as timothy, canaryseed and creeping red fescue in rotation following a crop treated with *Edge*. DO NOT seed wheat as a rotational crop onto land that has been treated with trifluralin and/or ethalfluralin at oilseed/special crop/barley rates for two consecutive crop years Thinning of crop may occur in areas that have received abnormally low amounts of precipitation or in crops that are emerging slowly.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool, dry place. May be frozen. DO NOT expose to prolonged sunlight or heat.

Buffer Zones: Toxic to fish and other aquatic organisms. DO NOT contaminate water bodies or wetland areas.

Tank Cleaning:

Refer to page 15.

Eptam 8-E

Herbicide Group
8 - EPTC
(Refer to page 38)

Company:

Gowan Canada (PCP#11284)

Formulation:

800 g/L of EPTC formulated as an emulsifiable concentrate.
Container size - 10 L, 1000 L

Caution:

The level of weed control may be reduced where *Eptam 8-E* is used on soils that have been treated with *Eptam 8-E* the previous growing season. It is expected that the reduction in control will be greater where *Eptam 8-E* have been used repeatedly for 2 or more years.

Crops, Rates and Staging:

Eptam 8-E is applied as a preplant incorporated treatment prior to seeding the following crops:

CROP	RATE (L/ACRE)	ACRES TREATED PER 10 L CONTAINER
Dry and snap beans	1.72 to 2.23	5.8 to 4.5
Alfalfa, Bird's-foot trefoil Cicer milkvetch** Sweet clover** Sunflowers*	1.72	5.8
Potatoes	1.72 to 3.44	5.8 to 2.9
Flax*	1.42 to 1.72	7.0 to 5.8

* May also be applied in late fall prior to freeze-up
** Seed production only

NOTE: The use of *Eptam 8-E* on flax is not recommended in Saskatchewan because of the risk of crop injury.

Where a rate range appears, use the lower rate on light textured soils and the higher rate on heavy textured soils. DO NOT use on soils with less than 3 percent organic matter or more than 15 percent organic matter.

Weeds and Staging:

Must be applied prior to the emergence of the following weeds. Emerged weeds will not be controlled.

Barnyard grass
Chickweed*
Corn spurry*
Green foxtail
Hairy nightshade*
Henbit *
Lamb's-quarters*
Nettleleaf goosefoot*
Pigweed (prostrate, redroot, tumble)*
Purslane*
Quackgrass (suppression)**
Volunteer cereals (wheat, barley, oats)
Wild oat
Yellow foxtail
Yellow nutsedge**

* Will be controlled only if treatment is made when conditions are favourable for germination and growth.

** Roots of perennial weeds must be thoroughly chopped prior to application.

Application Information:

Carrier Volume: Minimum of 40 L per acre of water or liquid fertilizer (see label for liquid fertilizer compatibility).

Pressure: 30 to 40 psi (200 to 275 kPa).

Equipment and Nozzles: Since *Eptam 8-E* is highly volatile, the product must be incorporated immediately. This is best accomplished by mounting spraying equipment directly onto the incorporation equipment (tandem disks, field cultivators on light soil).

May also be applied to cleanly cultivated soil for potatoes, by metering into the irrigation water to achieve the recommended rate per acre ("herbigation" or "chemigation"). See label for detailed instructions.

Incorporation: All growth and stubble should be thoroughly worked into the soil before treatment. Apply to a dry soil surface. Incorporate immediately after application preferably during the spraying operation as *Eptam 8-E* is volatile. Set disc and cultivator implements to cut to a depth of 4 to 6 inches (10 to 15 cm). A second operation at a right angle to the first is required. The disc or cultivator must be followed with a harrow or other levelling device that extends beyond the width of the implement. Speeds in excess of 5 mph (8 km/h) will result in excessive pulverization and trash destruction leaving the field susceptible to erosion. The maximum recommended tillage depth is 4 inches (10 cm).

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Crop injury can occur if stressful environmental conditions (cold, wet soils, drought or excessive heat) prevail after seeding. To minimize crop injury, delay seeding 10 days if these conditions prevail at the time of application, or select an alternative product. Very cold or dry soil conditions during weed emergence will reduce control.

Tank Mixes:

Herbicides:

Dry beans (white and red kidney only): Liquid formulations of *Treflan* and *Rival*.

Fertilizers: May be mixed with liquid fertilizer.

Compatibility test should be conducted according to instructions on the herbicide label.

Dry bulk fertilizers, except nitrate fertilizers, may be impregnated or coated with *Eptam 8-E*. The impregnated fertilizer should be spread uniformly onto the field using a double overlap pattern immediately after impregnation. The impregnated fertilizer must be applied to the field when the soil surface is dry to at least 1/2 inch (1.5 cm) depth. The first incorporation must be done immediately after application.

Insecticides: DO NOT tank mix with insecticides.

Fungicides: None registered.

Note: The above mixes are those listed on the *Eptam 8-E* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No effect once incorporated. DO NOT apply prior to pre-irrigation.

Grazing: DO NOT graze or feed treated crops to livestock in the year of application.

Re-cropping: Will not injure crops the year after spring application.

Aerial Application: DO NOT apply by air.

Storage: May be frozen.

Buffer Zones: DO NOT apply within 15 m of fish bearing waters or wildlife habitat.

Soil Type: DO NOT use on soils with less than 3 percent organic matter as crop injury will result.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Caution – Poison

For an explanation of the symbols used here see page 11.

Equinox*

Herbicide Group
1 - tepraloxydim
(Refer to page 38)

Company:

BASF Canada (PCP#27603)

Formulation:

200 g/L tepraloxydim formulated as an emulsifiable concentrate

Container size -

Equinox: 3.24 liters per jug;

Merge: 8.1 L

* *NOTE: This product is no longer manufactured, but some supplies may still remain in the distribution system. This product may be removed from future editions of this publication.*

Crops, Rates and Staging:

Rates are dictated by weed type and stage below.

CROP	RATE (mL/acre)	MAXIMUM STAGE
Canola[CL]	54 to 81	Prior to bud and flower formation
Chickpeas	54 to 101	9 node
CLEARFIELD Oilseed quality mustard (*Brassica juncea*)	54 to 81	Prior to bud and flower formation
Dry beans	54 to 101	7 trifoliate leaf
Flax, Solin (low linolenic acid flax)	54 to 101	35 cm
Field pea, Lentil[CL]	54 to 101	9 leaf
Mustard (brown, oriental, yellow),	54 to 81	6 leaf
Sunflower	54 to 81	10 leaf

[CL] Including CLEARFIELD varieties.

Weed, Rates and Staging:

Apply at the 1 to 6 leaf stage of the annual weeds listed below unless otherwise indicated.

Optimum yield response occurs when weeds are controlled early.

Equinox will not control weeds emerging after application.

WEEDS AND STAGES	RATE	
	mL/ACRE	ACRES PER 3.24 L JUG
Green foxtail, Wild oat, volunteer cereals (barley, oat, and wheat including CLEARFIELD varieties)	54 to 81*†	60 to 40*†
Quack grass control (3 to 6-leaf stage**)	101	32

Equinox must always be used with *Merge* adjuvant at a rate of 0.5 L of Merge per 100 L of total spray solution.

* Use the 40 acre/case rates when weed densities exceed 45-weeds per square meter.

** For optimum control of quackgrass apply at the 2 to 4 leaf stage prior to tillering (6 to 15 cm in height).

† Use higher rate in range when weed densities and overlapping are high, when staging is late, or when weeds are under stress and not growing as actively due to moisture stress or temperature stress.

Application Information:

Water Volume: 20 to 40 L per acre.
Ground: 20 to 40 L per acre.
Aerial: 10 to 20 L per acre.

Nozzles and Pressure: Use a minimum pressure of 35 psi (240 kPa) when using conventional nozzles. For high weed pressures or if crop or weed growth is dense use a pressure 40 to 62 psi (275 to 425 kPa). Low drift nozzles may require higher pressures for proper performance. Use 80° or 110° flat fan nozzles designed to deliver thorough, even coverage of ***ASABE medium*** droplets tilted forward at an angle of 45° are recommended for optimum coverage. The use of flood jet or hollow cone nozzles is not recommended. Consult with herbicide manufacturer regarding the suitability of low drift nozzles for use with this product.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Most effective control is achieved when grasses are actively growing. Weeds stressed by drought, flooding, hot or prolonged cool temperatures (<15°C) and poor fertility are more difficult to control. Use the higher of the recommended rates for grasses under stress. To avoid reduced control do not apply to grasses stressed because of lack of moisture, flooding, hail, herbicide damage, mechanical injury and widely fluctuating temperatures. To maximize control apply *Equinox* in warm weather as control may be reduced if temperatures are below 15°C.

Tank Mixes:

Tank mixes are not to be applied by air.

Herbicides:

In Flax and Solin (low linolenic acid flax):
Buctril M (0.41 L/acre) (Including Solin varieties)

In Field peas, CLEARFIELD canola, and CLEARFIELD lentil only:
Odyssey (17 grams/acre)

In LIBERTY LINK canola only:
Liberty 150SN (1.08 to 1.35 L/acre)

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Allow 4 days between the application of *Equinox* and any chemical not recommended as a tank mix.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 1 hour may reduce control.

Re-Entry: DO NOT enter treated fields for 12 hours.

Grazing: Field peas may be used for grazing following the 60-day Preharvest interval. DO NOT graze other treated crops or cut for feed prior to crop maturity.

Preharvest Interval: Lentil, field peas, canola & flax – 60 days.

Recropping: Leave at least 14 days between application and replanting of cereal or grass crops. Leave at least 40 days between application and the seeding of other crops. The company recommends that treated area be cultivated to a depth of 10 cm at least 7 days prior to seeding.

Aerial Application: May be applied by air.

Storage: Store in a cool, dry, well-ventilated area without floor drain away from food, feed, seed or fertilizers.

Buffer Zones: Leave a buffer of 1 meter from the down wind edge of the boom and sensitive terrestrial habitat by ground and 25 m by airplane or helicopter. Corn is particularly sensitive.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Caution – Poison

⚠ Warning – Eye and Skin Irritant

For an explanation of the symbols used here see page 11.

Escort

Herbicide Group
2 - metsulfuron
(Refer to page 38)

Company:

E. I. duPont Canada (PCP#23005)

Formulation:

60% metsulfuron methyl formulated as a water dispersible granule.

Container size - 0.25 kg.

Crops and Staging:

Pasture, rough turf, and rangeland - No stage restrictions.

Weeds, Rates and Staging:

For seedling weeds apply to young plants up to 4 inches (10 cm) tall or wide. For established non-woody plants (biennial or perennial) apply up to the early bud stage. For western snowberry, wild rose and other woody species, apply between mid-June and mid-August after the brush has leafed out, but before the leaves begin to turn their fall colours.

RATE	WEEDS CONTROLLED	
8 g/acre	Canada thistle* Dandelion* Russian thistle Sow-thistle*	Common tansy Kochia† Scentless chamomile Sweet clover
10 g/acre	***Above weeds plus:*** Canada thistle* Sow-thistle*	 Dandelion* Western snowberry
12 g/acre	***Above weeds plus:*** Wild rose Canada thistle*	 Dandelion Sow-thistle*
40 g/acre**	Balsam poplar	Willow
60 g/acre**	Cherry	Trembling aspen

At all rates add *Agral 90, Agsurf*, or *Citowett* at 0.2 L per 100 L of spray solution.

* Suppression only.

** Rangeland only. See label for detailed application instructions.

† *NOTE: Surveys of fields with kochia have found that roughly 90% of these kochia populations were resistant to Group 2 herbicides. Without testing that confirms otherwise, assume that kochia in your field is likely resistant as well and is unlikely to be controlled by* Escort *alone.*

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information

Water Volume: 40 to 91 L per acre for weedy growth and up to 809 L per acre applied to the point of run-off for woody species. See the label for details.

Nozzles and Pressure: 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE coarse*** droplets.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

DO NOT apply during periods of intense rainfall or to soil saturated with water. Warm, moist conditions following treatment enhance the activity of *Escort*, while cold, dry conditions may reduce or delay activity. Brush hardened off by cold weather and drought stress may not be controlled.

Tank Mixes:

Herbicides:

2,4-D amine or ester at 0.79 L/acre (500 g/L formulations) plus surfactant.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Re-Entry: DO NOT re-enter treated fields for 12 hours.

Grazing: May be grazed by cattle on the day of treatment.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool, dry place. May be frozen.

Buffer Zones:

Rate (g/acre)	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat**
	Less than 1 m	Greater than 1 m	
8 to 12	1	1	10
40	2	1	35
60	3	1	45

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

** Terrestrial buffers are not required for transport and utility rights of way

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Handheld or backpack sprayers do not require a buffer zone.

Tank Cleaning:

Escort can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray *Escort* should be flushed out immediately after use. The manufacturer recommends that sprayers used to apply this product be flushed twice with water/ammonia solution (1 L of 3% household ammonia per 100 L of water). All nozzles, screens and filters should be removed and cleaned with water/ammonia solution after applying this product. DO NOT clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Refer to page 14 for more information on tank cleaning.

Hazard Rating:

⚠ Caution – Eye Irritant

For an explanation of the symbols used here see page 11.

Everest (2011)

See flucarbazone on page 159.

Everest GBX

Herbicide Group
2 - flucarbazone
4 - fluroxypyr
(Refer to page 38)

This product is a prepackaged tank mix of *flucarbazone* (page 159) and *GBX* ('A' component of *Attain*, *Prestige* and *Trophy*). Information listed is restricted to Crop, Weeds, Rates, and Tank mixes. For other detailed restrictions and other general information on the component products see the product pages listed above.

Company:

Arysta LifeScience Canada

Formulation:

Everest GBX has two components. Either:

***Everest 70WDG* (PCP#26447):** 66% flucarbazone formulated as a water dispersible granule.
Container size - 567 g bottle
***Starane GBX* (PCP# 29670):** 180 g/L of fluroxypyr formulated as an emulsifiable concentrate.
Container size - 9.6 L

-or-

***Everest 2.0* (PCP#30342):** 397 g/L flucarbazone formulated as a suspension concentrate.
Container size - 1.937 L container

***GBX* (PCP# 29958):** 333 g a.e./L of fluroxypyr formulated as an emulsifiable concentrate.
Container size - 5 L

Crops and Staging:

Spring wheat (including durum) with 2 leaf to a maximum of 4 main stem leaves plus 2 tillers (6 total leaves).

Tank mix options are listed in the tank mix section.

Note: Some of the tank mix partners may have more limiting staging than Everest. When tank mixing use the most restrictive application stage or injury may result.

Weeds, Rates and Staging:

RATE (Acres per case)	WEEDS
50 (for 70WDG forms) -or- 100 (for liquid flucarbazone forms)	**Weeds controlled by flucarbazone 70WDG at 11.5 g per acre or flucarbazone liquid at 19.4 mL per acre plus:** Cleavers from the 1 to 4 whorl stage Kochia (2 to 8 leaf stage) (2,4-D ester mix only) Wild buckwheat (1 to 4 leaf stage)*
40 (for 70WDG forms) -or- 80 (for liquid flucarbazone forms)	**Weeds controlled by flucarbazone 70WDG at 14.4 g per acre or flucarbazone liquid at 24.3 mL per acre plus:** Kochia (2 to 8 leaf stage) Volunteer flax (1 to 12 cm) Stork's-bill (Suppression only) (1 to 8 leaf)

As well as any of the weeds controlled by the tank mix partner

This product MUST ALSO BE MIXED with one of either *2,4-D Ester, MCPA Ester* or *Curtail M.*

Add non-ionic surfactant (such as *Agral 90, Agsurf*) at 0.25 L per 100 L of spray solution.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Tank Mixes:

Herbicides:

*Note: All mixes **must** be applied with a registered surfactant unless otherwise indicated. Only one registered surfactant is required.*

In spring wheat (including durum):
2,4-D Amine or *Ester* at recommended rates up to 0.34 L/acre (500 g/L formulation)

In spring wheat (NOT including durum):
2,4-D Amine or *Ester* at recommended rates up to 0.45 L/acre (500 g/L formulation)
Curtail M (0.6 to 0.8 L/acre)
MCPA Amine or *Ester* at recommended rates up to 0.45 L/acre (500 g/L formulation)

Fertilizers: None.

Insecticides: None

Note: The above mixes are those listed on the *Everest GBX* label only. To check for other possible registeredmixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 1 hour of application may reduce control.

Grazing: DO NOT graze treated fields. Mature grain or straw may be fed to livestock.

Preharvest: Leave at least 80 days from application to harvest.

Re-cropping Interval: Follow the chart below for *Everest GBX* components only. If mixing with *Curtail M* as well check for any additional recropping restrictions on the *Curtail M* page:

Soil Zones and Rotational Crops		
Grey-Wooded	**Black and dark brown**	**Brown**
Spring Wheat Barley Canola (all varieties) Field Peas*	Wheat (Spring & durum) Barley Canola (all varieties) Field Peas* Flax	Spring Wheat

* Field peas may be grown the year following *Everest GBX* application in fields where precipitation has been equal to or above the 10 year average during the growing season, and where organic matter content is above 4%, and pH is below 7.5. The company suggests a minimum of 100 mm (4 inches) of rain is needed in the 60 days following application for adequate breakdown to take place.

NOTE: Other rotational crops may also be affected if rainfall is less than the 10 year average for the area. Soils in the grey wooded, black and dark brown soil zones with a combination of low organic matter (less than 2%), light textured soils or high pH (greater than 7.5) (i.e. eroded knolls, sandy soils) may result in delayed growth and development in rotational crops.

Aerial Application: DO NOT apply by air.

Storage: Store in closed original container in a cool, dry area away from fertilizers, food or feed. DO NOT freeze *Everest GBX*. If frozen bring *Everest GBX* component to room temperature and agitate (shake) before use. The *GBX* component is combustible – DO NOT store near heat or open flame.

Buffer Zones: Leave at least 20 m from the downwind edge of the spray swath to sensitive upland plants like shelterbelts and woodlots and at least 35 m to water sources or wetland habitats. Avoid drift onto sensitive crops like canola and tame oat. DO NOT mix or load within 10 m of water sources or wetland habitats.

Tank Cleaning:

Everest GBX residues in the spray tank can cause severe injury to sensitive crops at very low concentrations. Sprayers should be cleaned out immediately before using another product. Follow the steps below:

1. Drain the tank and thoroughly rinse the spray tank, boom and hoses with clean water. Pay particular attention to flushing out any visible deposits.

2. Fill the tank with ammonia/water solution (1 L of 3% household ammonia per 100L of water) and flush the hoses, boom and nozzles with the solution. Circulate for at least 15 minutes. Flush hoses, boom and nozzles once more, then drain the tank.
3. Remove all nozzles, screens and filters and clean in a separate container using an ammonia/water solution as above.
4. Repeat #2.
5. Rinse tank, boom and hoses with clean water. And wash any residue from the outside of the tank.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk. For additional information on tank cleaning see page 14.

Hazard Rating:

Everest Component:

◇ Warning – Contains the Allergen Milk

GBX component:

☠ Danger – Poison

◇ Warning – Eye and Skin Irritant

▽ Caution – Skin Irritant

▼ Caution – Flamable

For an explanation of the symbols used here see page 11.

Express Pro

Herbicide Group

2 - tribenuron & metsulfuron

(Refer to page 38)

Company:

E. I. duPont Canada (PCP#29212)

Formulation:

42.9% tribenuron methyl, and 8.6 % metsulfuron methyl formulated as a water soluble granule.

Container size - 560 g container.

Express Pro is purchased alone but must be used in a mix with glyphosate before use.

Crops and Staging:

Allow at least one day (24 hours) prior to seeding barley, winter wheat, and wheat (durum , spring, winter) and summer-fallow.

Allow 10 days between summer-fallow treatment and tillage.

DO NOT use *Express Pro* on highly variable soils that have large gravely or sandy areas, eroded knolls or calcium deposits

Weeds, Rates and Staging:

***Express Pro* at 7 g per acre (one container treats 80 acres) plus glyphosate at a rate equivalent to 180 g ae per acre (equivalent of 0.5 L per acre of a 360 g per L formulation):**

Weeds controlled by glyphosate products at these rates plus up to 3 inches (8 cm) unless otherwise indicated:

Canada thistle rosettes**
Cleavers†
Cow cockle*
Dandelion ***†
Narrow-leaved hawk's-beard†
Night-flowering catchfly**
Scentless chamomile
White cockle (rosettes)
Volunteer canola
 (including glyphosate tolerant varieties) ***†

† Residual control
* Up to the 3 leaf stage
** Suppression only
*** Up to 6 inches

Express Pro may degrade if left in the sprayer for an extended period. Apply within 24 hours of mixing.
Refer to the product label for complete mixing instructions.
A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 22 to 45 L per acre.

Nozzles and Pressure: Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets. Low drift nozzles may require higher pressures for proper performance.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Registered crops seeded following *Express Pro* application become stressed by drought, low fertility, saline soils, waterlogged soils (soils at or near field capacity), disease or insect damage may be injured. This injury may be worse on light or low organic matter soils. Weeds hardened off by environmental stress such as those above may not be adequately controlled.

Tank Mixes:

Herbicides: Must be mixed with glyphosate.

Insecticides: None registered.

Fungicides: None registered.

Fertilizers: None registered.

Note: The above mixes are those listed on the *Express Pro* label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check product labels for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Re-Entry: Wait 12 hours before re-entering treated fields.

Re-cropping: Barley and wheat (spring, winter and durum) may be seeded 24 hours after application. Canola and peas may be planted 10 months following application.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool, dry place. May be frozen.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat**
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	4

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Express Pro can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray this product should be flushed out immediately after use.

1. Drain tank and flush tank, boom and hoses with clean water.
2. Visually inspect tank to ensure removal of all visible herbicide residues. If necessary, repeat Step 1.
3. Fill the tank with clean water, and then add 1 litre household ammonia (containing minimum of 3% ammonia) per 100 litres of water, or equivalent amount of a sprayer tank cleaner containing ammonia,
4. Flush solution through boom and hoses, and then add more water to completely fill tank. Allow to sit for 15 minutes with agitation.
5. Drain the tank.
6. Remove the nozzles, screens, and boom end caps and clean separately in a bucket containing ammonia cleaning agent and water.
7. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing water through the hoses and boom.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk. See product label for more detailed cleaning instructions. For additional information on tank cleaning see page 14.

Hazard Rating:

☠ Caution – Poison

◇ Warning – Eye Irritant

⚠ Potential Skin Sensitizer.
Contains the allergens sulphites and milk.

For an explanation of the symbols used here see page 11.

Express SG (2011)

See 'Tribenuron" on page 282.

Fenoxaprop

Herbicide Group
1 - fenoxaprop
(Refer to page 38)

Company:

Bayer CropScience (*Puma^{120} Super, Puma Advance*)
Farmers of North America (*HellCat*)
IPCO (*Vigil*)
MANA Canada (*Bengal*)
Nufarm Agriculture (*Cordon*)
Viterra (*WildCat*)
Cheminova (*Cougar*)

Formulation:

***Puma^{120} Super* (PCP#25864), *Bengal* (PCP#29268), *Cordon* (PCP#29494), *Cougar* (PCP#30473),*HellCat* (PCP#30055), *Vigil* (PCP#29273), *WildCat* (PCP#29151):**
120 g/L fenoxaprop-p-ethyl formulated as an emulsifiable concentrate.
Container size* - 6.2 L, 12.4L, 18.6 L, 99.3L, 312L.

***Puma Advance* (PCP#29615):** 90 g/L fenoxaprop-p-ethyl.
Container size - 8.25L, 123.75L, 412.5L.

* Check with individual suppliers for the container sizes they have available.

Crops and Staging:

Application beyond the maximum rates provided below may result in crop injury.

CROP	STAGE
Spring wheat (including durum), Barley[†]	1 to 6 leaves on the main stem plus 3 tillers
Barley[††]	1 to 5 leaves on the main stem plus 2 tillers

CROP	STAGE
Perennial ryegrass seedlings (seed production only)*	2 to 4 leaves
Meadow bromegrass (seedling or established) (forage or seed production)**	

[†] ***Puma Advance* only.** Late application of other products could result in injury to barley

[††] ***Puma^{120} Super, Cordon, HellCat* or *WildCat* only.** Apply to barley only when tank mixed with a registered broadleaf product. *NOTE: Application of other fenoxaprop products to barley can result in crop injury.*

* Perennial ryegrass with ***Puma^{120} Super, Cordon, Cougar*** or ***WildCat*** by ground only.

** Meadow bromegrass with ***Puma^{120} Super*** or ***Puma Advance*** by ground only.

NOTE: Since the uses on forage grasses were registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance. ***Those who apply this use do so at their own risk.***

Durum wheat, forage grasses and barley may experience some initial, temporary stunting and yellowing that rarely results in yield loss. Injury is more likely under stress conditions (see "Effect of Growing Conditions" section).

Treatment at the 3 to 4 leaf stage of cereal crops and weeds will maximize crop tolerance and weed control. Temporary crop injury such as shortening or discolouration may be observed after application. Such injury is more likely to occur in barley and also when *fenoxaprop* is applied outside recommended stages.

Application Information:

Water Volume:

Ground application: 23 to 45 L per acre. Use higher water volumes for dense canopies.

Aerial application: A minimum of 14 L per acre.

Nozzles and Pressure: Use 40 psi (275 kPa) when using conventional 80° or 110° flat fan nozzles. Angle nozzles forward at 45° to improve contact with vertical leaf surfaces. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver proper coverage with ***ASABE medium*** droplets or larger.

DO NOT use flood jet nozzles, controlled droplet application equipment or Spra-foil equipment.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

DO NOT apply *fenoxaprop* 2 to 3 days prior to, or following, temperatures of 3°C or lower as crop injury may occur. Under stressful conditions (hot/dry, water logging, disease or insect damage) or heavy crop canopy, early application will improve weed control.

DO NOT apply by air when both the temperature is greater than 25°C and the relative humidity is less than 30%.

Weeds, Rates and Staging:

Apply from the 1 to 6 leaf stage up to emergence of 3rd tiller of the weeds below. Apply at the 3 to 4 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are removed before tillering. DO NOT apply *fenoxaprop* or products containing *fenoxaprop* to a crop more than once per year.

WEEDS	**RATE (mL/ACRE)**		**RATE (ACRES PER PACKAGE†)**
	Puma Advance	**120 g/L forms**	
Green foxtail only	206	156	80
Low wild oat infestations*	360	271	46
Moderate-heavy wild oat infestations, barnyard grass, green and yellow foxtail	413	312	40

† Based on 12.4 L for 120g/L formulations and 16.5 L for *Puma Advance*.

* Low wild oat rate for use on WHEAT AND DURUM ONLY, and when applied alone and NOT in a tank-mix. NOT for use with perennial ryegrass or meadow bromegrass.

Tank Mixes:

Herbicides:

DO NOT apply Puma^{120} Super, Cordon or WildCat in barley without a broadleaf herbicide mix. ALWAYS tank mix with a registered broadleaf herbicide.

NOTE: DO NOT apply Bengal or Vigil in barley.

The letter codes in the following chart indicate:

W/B = Spring Wheat (including durum) and Barley only.
W = In Spring Wheat(including Durum) only.

	Puma Advance	*Puma 120 Super*	*Cordon*	*WildCat*	*Bengal*	*Vigil*	*HellCat*	*Cougar*
2,4-D Ester LV 600 (0.28 L/acre), *LV 700* (0.24 L/acre)	W/B	W/B	W/B	W/B	W	W	W	W/B
Ally (2 to 3 g/acre)	W/B	W/B	W/B	W/B	W	W	W	W/B
Attain XC	W/B							W
Bromoxynil + 2,4-D ester (0.4 L/acre) Δ	W/B	W/B	W/B	W/B	W	W	W/B	W/B
Bromoxynil/MCPA ester (0.4 L/acre) Δ	W/B	W/B	W/B	W/B	W	W	W/B	W/B
Curtail M (0.6 to 0.8 L/acre)	W/B	W/B	W/B	W/B	W	W	W/B	W/B
Dichlorprop/2,4-D (label rate) Δ	W/B	W/B	W/B	W/B	W	W	W/B	W/B
Estaprop XT			W/B					W/B
DyVel (0.5 L/acre)**	W/B	W/B	W/B	W/B	W	W	W/B	W/B
DyVel DSp (0.45 L/acre)	W		W					W
Infinity (0.33 L/acre)	W/B	W/B						
Lontrel 360 (0.17 L/acre)	W	W	W	W	W	W	W	W
Lontrel 360 (0.17 L/acre) + *MCPA Ester* (0.34 L/acre)* (500 g ai/L formulation)	W	W	W	W	W	W	W	W
Lontrel 360 (0.112 L/acre) + *MCPA Ester* (0.34 to 0.45 L/acre)* (500 g ai/L formulation)	W	W	W	W	W	W	W	W
MCPA Amine or *Ester* (0.34 L/acre) (500 g ai/L formulation)	W/B	W/B	W/B	W/B	W	W	W/B	W/B
Mecoprop-p (2.2 to 2.8 L/acre)*Δ			W					W
Prestige XC	W/B							W/B
Refine SG (12 g/acre)	W/B							W/B
Refine SG (12 g/acre) + *MCPA* (0.34 L/acre)	W/B							W/B
Refine SG (4 g/acre)+ *Buctril M* (0.4 L/acre)	W/B							W/B
Spectrum (20 acres/case rate)**	W/B	W/B	W/B	W/B	W	W		W/B
Triton C	W/B							
Trophy (20 acres per case)*	W/B	W/B	W/B	W/B	W	W		W/B

Δ Manufacturers may only support mixes with specific brands. Contact the manufacturers for more information.

* Use only at the high rate of *fenoxaprop*.

** Use only at the green foxtail rate of *fenoxaprop*.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *fenoxaprop* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

***Fenoxaprop* manufacturers may also support mixes with pesticides that are not on the *fenoxaprop* labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.**

Leave an interval of 7 days prior to application or 4 days after application of *fenoxaprop*, when applying any pesticide that is not registered as a tank mix.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 1 hour may reduce control.

Re-Entry: DO NOT re-enter treated fields for 12 hours.

Grazing: DO NOT graze or cut cereal crops or meadow bromegrass for hay, within 25 days of application. DO NOT graze or cut perennial ryegrass crop for hay within 65 days of application.

Preharvest Interval: DO NOT harvest within 65 days of application.

Re-cropping: No restrictions in the year after application. Only one application may be made per year.

Aerial Application: May be applied by air.

Storage: DO NOT freeze.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:	
	Aquatic Habitats	Terrestrial habitat
Ground*	3	10
Aerial	3	33

See the key to product pages on page 27 for an explanation of the different habitats.

* These distances can be reduced by 30% using cones on individual nozzles and by 70% using a full shield (shroud, curtain) that extends to the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Caution – Poison.

Puma*^{120} *SuperSuper, Cougar, HellCat* and *WildCat:

Warning – Eye and Skin Irritant.

Bengal:

Danger – Eye and Skin Irritant

All:

Warning – Contains the allergen soy

For an explanation of the symbols used here see page 11.

FlaxMax DLX*

This product is a prepackaged tank mix of *Equinox* (page 147) and *FlaxMax* (*Curtail M* page 125). Information listed is restricted to Crop, Weeds, Rates and other important details. Refer to the component products listed above for detailed information on restrictions and the effects of growing conditions.

Herbicide Group

1 - tepraloxydim
4 - clopyralid & MCPA
(Refer to page 38)

Company:

BASF Canada

Formulation:

One case of *FlaxMax DLX* contains 3 components:

Equinox **(PCP#27603):** 200 g/L tepraloxydim formulated as an emulsifiable concentrate.
Container size - 1.62 L .

FlaxMax **(PCP#25819):** 50 g/L clopyralid and 280 g/L MCPA ester formulated as an emulsifiable concentrate.
Container size - 2 x 8 L.

Merge **adjuvant (PCP#24702):**
Container size - 4.05 L.

* *NOTE: This product is no longer manufactured, but some supplies may still remain in the distribution system. This product may be removed from future editions of this publication.*

Crops and Staging:

Flax (NOT including Solin varieties): 2 to 6 inches (5 to 15 cm) in height. Spraying at an early stage will reduce the risk of crop injury.

Weeds, Rates and Staging:

Grass weeds controlled by *Equinox* at 81 mL per acre plus broadleaf weeds controlled by *Curtail M* at 0.8 L per acre (20 acres per case):

***Flaxmax DLX* requires the addition of *Merge* adjuvant** at 0.5 L per 100L of spray solution.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Restrictions:

See component products *Equinox* and *FlaxMax (Curtail M)* for more information on restrictions application details and handling. Use the most limiting restrictions across all components for the mix.

NOTE: Breakdown of FlaxMax (Curtail M) *may be slowed or delayed by environmental conditions such as drought, and/or excessive cold resulting in an increased risk of injury to certain rotational crops. Legume crops are very sensitive to residues of* FlaxMax. *See rotational restrictions for* Curtail M *or contact manufacturer for additional information on recropping intervals (1-877-371-2273).*

Flucarbazone

Herbicide Group
2 - flucarbazone
(Refer to page 38)

Company:

Arysta LifeScience Canada (*Everest*)
Syngenta (*Sierra*)

Formulation:

Everest 70 WDG* **(PCP# 26447);** ***Sierra 70 WDG**** **(PCP# 29558):** 66% flucarbazone formulated as a water dispersible granule.
Container size - 567 g bottle.

Everest 2.0 **(PCP#30342),** ***Sierra 2.0*** **(PCP# 30430):** 397 g/L flucarbazone formulated as a suspension concentrate.
Container size - 1.94 L

** Note: This formulation is no longer manufactured, but some supplies may still remain in the distribution system. This product may be removed from future editions of this publication.*

Crops and Staging:

Spring wheat (including durum) with 1 leaf to a maximum of 4 main stem leaves plus 2 tillers (6 total leaves). Tank mixes containing 2,4-D provide improved crop safety. Tank mix options are listed in the tank mix section.

Note: Several of the tank mix partners have more limiting staging than flucarbazone. When tank mixing use the most restrictive application state or injury may result.

Weeds, Rates and Staging:

WEED	STAGE	RATE			
		70DF		2.0	
		GRAMS PER ACRE	ACRES PER 567 g	mL PER ACRE	ACRES PER 1.937 L
Green foxtail* Green foxtail*, wild oat*, volunteer canola*	Up to 6 leaf, maximum of 4 main stem leaves and 2 tillers	8.7	66	14.6	134
Green foxtail*, wild oat*, volunteer canola*	**Grass weeds**: Up to 6 leaf, maximum of 4 main stem leaves and 2 tillers **Broadleaf weeds:** 2 to 6 leaf stage following the use of *PrePare* prior to seeding.	8.7 (*PrePare*) Plus 8.7 (foliar)†	66 Plus 66	N/A	N/A
Weeds listed above plus: Wild oat* (light infestations) (< 100 plants/m^2), volunteer oat, green smartweed, redroot pigweed*, shepherd's-purse*, volunteer canola*, wild mustard*, stinkweed* (2 to 9 leaf stage)	**Grass weeds:** 1 to 6 leaf, maximum of 4 main stem leaves and 2 tillers **Broadleaf weeds:** 2 to 6 leaf stage	11.5	50	19.4	100
Weeds listed above plus: Wild oat* (heavy populations) (> 100 plants/ m2) under ideal conditions for spraying.	1 to 6 leaf, maximum of 4 main stem leaves and 2 tillers	14.4	40	24.3	80
Weeds listed above plus: Wild oat* (heavy populations) (> 100 plants/ m2) under poor environmental conditions or when mixing with *DyVel* or *Target*.	1 to 6 leaf, maximum of 4 main stem leaves and 2 tillers	17.4	33	29.1	67

† *Everest* only

Both formulations of flucarbazone require the addition of a non-ionic surfactant (*Agral 90, Agsurf, Surf 92, Super Spreader, LI700*) at 0.25 L per 100 L of spray solution.

Note: Only Agral 90 *and* Ag-Surf *may be used with 20 L per acre water for WDG formulations.*

* Will not control imidazolinone tolerant (CLEARFIELD) canola volunteers or Group 2 resistant weed biotypes.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume:

Spring wheat: 20 to 40 L per acre.

Note: Only *Agral 90* and *Ag-Surf* may be used at the 20 L per acre water rate for WDG formulations.

Durum wheat and green foxtail control rate: 40 L per acre.

Nozzles and Pressure: Use 30 to 50 psi (200 to 345 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift.

Use of flood-jet or controlled droplet application equipment is not recommended due to poor coverage.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Crop tolerance and weed control may be reduced if applications are made to plants growing under stress. Stress includes saturated or water-logged soil, drought, extreme temperatures, low fertility or visible disease symptoms at application. Adopting practices to increase crop vigour will improve crop tolerance.

Tank Mixes:

Herbicides:

Note: All mixes must be applied with a registered surfactant unless otherwise indicated. Only one registered surfactant is required. Flucarbazone at the 11.5 g and 17.4 g/acre rates of 70WDG forms g/acre or the 19.4 mL and 29.1 mL/acre rates of liquid forms can be used in the tank-mixes listed below, unless otherwise indicated. All tank-mix partners listed below may be mixed with flucarbazone at the green foxtail rate (70WDG forms - 8.7 g/acre ; Liquid forms - 14.6 mL/acre).

In spring wheat (including durum):

2,4-D Amine or Ester at recommended rates up to 0.34 L/acre (500 g/L formulation)* †
Spectrum (20 acres per case)*

In spring wheat (NOT including durum):

2,4-D Amine or *Ester* at recommended rates up to 0.45 L/acre (500 g/L formulation) †
Ally at 2 to 3 g/acre + *2,4-D Amine* or *Ester* up to rates recommended above*†◇
Buctril M (0.4 L/acre)
Curtail M (0.6 to 0.8 L/acre)* ◇
DyVel (0.5 L/acre)*#
Estaprop/Dichlorprop D (0.71 L/acre) †
Frontline 2,4-D (label rate)* †
MCPA Amine or *Ester* at recommended rates up to 0.45 L/acre (500 g/L formulation)*
Pardner (0.4 L/acre)*#
Target (0.4 to 0.6 L/acre)* # ◇ ††
Thifensulfuron/Tribenuron 75DF forms
Thumper (0.4 L/acre)†
Trophy (label rates) ##

* Registered for use with *Agral 90* and *Agsurf* surfactants for WDG formulations only.
◇ Apply in 40 L/acre of water only.
† Mixes containing 2,4-D provide improved crop safety (for WDG formulations only).
†† Wild oat control may be reduced with this mix.
# Tank-mix only with the high wild oat rate of *flucarbazone* (70WDG forms - 17.4 g/acre or Liquid forms - 29.1 mL/acre).
## With liquid formulations only.

Fertilizers: None.

Insecticides: None

Note: The above mixes are those listed on the *flucarbazone* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

***Flucarbazone* manufacturers may also support mixes with pesticides that are not on the *flucarbazone* labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.**

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Rainfall within 1 hour of application may reduce control.

Re-entry: DO NOT re-enter treated area within 12 hours.

Grazing: DO NOT graze treated fields. Mature grain or straw may be fed to livestock.

Preharvest Interval: Leave at least 80 days from application to harvest

Re-cropping Interval: Follow the chart below:

Soil Zones and Rotational Crops			
Grey-Wooded	**Black**	**Dark Brown**	**Brown**
Spring Wheat	Spring Wheat	Spring Wheat	Spring Wheat
Barley	Barley	Barley	
Canola (all varieties)	Canola (all varieties)	Canola (all varieties)	
Field Peas*	Durum Wheat	Durum Wheat	
	Field Peas*	Field Peas*	
	Flax	Flax	
	Field Bean		

* Field peas may be grown the year following *flucarbazone* application in fields where precipitation has been equal to or above the 10 year average during the growing season, and where organic matter content is above 4%, and pH is below 7.5. The company suggests a minimum of 100 mm (4 inches) of rain is needed in the 60 days following application for adequate breakdown to take place.

NOTE: Other rotational crops may also be affected if rainfall is less than the 10 year average for the area. Soils in the grey wooded, black and dark brown soil zones with a combination of low organic matter (less than 2%), light textured soils or high pH (greater than 7.5) (i.e. eroded knolls, sandy soils) may result in delayed growth and development in rotational crops.

Aerial Application: DO NOT apply by air.

Storage: Store in closed original container in a cool, dry area away from fertilizers, food or feed. Dry formulations are not affected by storage at freezing temperatures. DO NOT freeze liquid formulations.

Buffer Zones: Leave at least 20 m from the downwind edge of the spray swath to sensitive upland plants like shelterbelts and woodlots and at least 35 m to water sources or wetland habitats. Avoid drift onto sensitive crops like canola and tame oat. DO NOT mix or load within 10 m of water sources or wetland habitats.

Tank Cleaning:

Flucarbazone residues in the spray tank can cause severe injury to sensitive crops at very low concentrations. Sprayers should be cleaned out immediately before using another product.

Follow the steps below:

1. Drain the tank and thoroughly rinse the spray tank, boom and hoses with clean water. Pay particular attention to flushing out any visible deposits.
2. Fill the tank with ammonia/water solution (1 L of 3% household ammonia per 100L of water) and flush the hoses, boom and nozzles with the solution. Circulate for at least 15 minutes. Flush hoses, boom and nozzles once more, then drain the tank.
3. Remove all nozzles, screens and filters and clean in a separate container using an ammonia/water solution as above.
4. Repeat #2.
5. Rinse tank, boom and hoses with clean water. And wash any residue from the outside of the tank.

DO NOT clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk. For additional information on tank cleaning see page 14.

Hazard Rating:

⚠ Warning – Contains the Allergen Milk

For an explanation of the symbols used here see page 11.

Flumioxazin (Chateau/Valtera)

Herbicide Group
14 - flumioxazin
(Refer to page 38)

Company:

Valent Canada, Inc.

Formulation:

51.1% flumioxazin formulated as a water dispersible granule.

Container size -

***Chateau* (PCP#29231)** - 1.13 kg

***Valtera* (PCP#29230)** - 2.27 kg

Crops, Rates, and Staging:

Valtera:

Soybeans: Prior to seeding or up to 3 days after seeding but prior to emergence.

If weeds are emerged apply Valtera in a mix with glyphosate (see tank mix section).

Dry Bean Desiccation:

Apply 42.5 g per acre when beans are mature to dry green weed material. Add metholated seed oil at 1 L per acre.

Chateau:

Potatoes: Apply after hilling. A minimum of 2 inches (5 cm) of soil must cover the vegetative portion of the potato or crop injury may result.

Weeds, Rates, and Staging:

Apply prior to crop and weed emergence.

WEEDS	**Soil Type (all must have less than 5% organic matter)***	**RATE** (g/acre)
***Chateau* - In potatoes only.**		
Suppression of: Pigweed (green, redroot) Common ragweed Lamb's-quarters Hairy nightshade Eastern black nightshade	Coarse and medium textured	42.5
***Valtera* - For soybeans only.**		
Control of the weeds suppressed by Chateau above plus; Dandelion Green foxtail (suppression)	Coarse textured	56.7
	Medium textured	85

DO NOT apply on soils with > 5% organic matter, or fine soils. Soils such as clay, clay loam, silty clay or silty clay loam are considered fine textured soils. DO NOT apply to soils composed of more than 90% sand and gravel.

Spray within 6 hours of mixing.

Application Information:

Water Volume: Minimum application volume is not indicated on the label. Use appropriate water volumes to ensure good spray coverage.

Nozzles & Pressure: Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets.

DO NOT perform any tillage operations after application otherwise weed control will be reduced.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Rainfall is required to activate *flumioxazin* in the soil. Crop injury may occur when soils are wet and cool following application or soils are poorly drained. Severe injury may occur with flooded soils. Newly emerging foliage can be temporarily injured by heavy rain splashing treated soil on leaves.

Tank Mixes:

Herbicides:

Soybeans only:

Glyphosate (IPA or K salts) (1.35 L/acre - 360 g/L formulations - see page 163 for rates for other glyphosate formulations).

Dry Bean Desiccation only:

Glyphosate (IPA or K salts) at preharvest rates.

Fertilizers: None registered.

Fungicides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Rain or irrigation shortly after application is required for activation. If rainfall does not occur, irrigation with at least 5 mm of water is recommended before ground crack occurs.

Re-entry: DO NOT re-enter treated fields for 12 hours.

Grazing: DO NOT graze or cut crops for livestock feed from treated fields.

Preharvest:

Desiccation: Leave 5 days between application and harvest. Leave 7 days to harvest if mixing with glyphosate.

Re-cropping: Soybeans may be seeded immediately after treatment. Winter wheat may be seeded in the fall following spring application. Alfalfa, barley, canola, field corn, sorghum, dry edible beans**, sunflower and spring wheat may be seeded the season after spring application. All other crops require a minimum of 12 months and a successful bioassay prior to indicate safe seeding.

*** Note: Not all varieties of dry beans have been tested for recrop tolerance. Test new varieties of dry beans on a small area before attempting large acreages.*

Aerial Application: DO NOT apply by air.

Storage: Store in a cool, dry place. May be frozen.

Buffer Zones:

Crops	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Potato	2	1	5
Soybean	3	2	10

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

Tank Cleaning:

Refer to page 15. After flumioxazin is applied please follow steps for 'Ammonia Rinse'. See product label for further information.

Hazard Rating:

Caution – Poison

For an explanation of the symbols used here see page 11.

Fluroxypyr + 2,4-D

Herbicide Group
4 - fluroxypyr & 2,4-D
(Refer to page 38)

Company:

Dow AgroSciences (*Attain XC, OcTTain XL*)
Nufarm Agriculture (*Flurox 2,4*)

Formulation:

The *Attain XC* package has 2 components:
***Attain XC A* (PCP#29463):** 333 g/L fluroxypyr
***Attain XC B* (PCP#29264):** 660 g/L 2,4-D LV ester
Container sizes -
Attain XC A: 5L, or 8 x 15L
Attain XC B: 2 x 6.8 L, or 4 x 82L

-or-

The *Flurox* 2,4 package has 2 components:
***Nufarm Fluroxypyr 180* (PCP#30028):** 180 g/L fluroxypyr.
***2,4-D Ester 700* (PCP#27820):** 660 g/L 2,4-D LV ester.
Container sizes -
Nufarm Fluroxypyr 180: 9.6 L
2,4-D Ester 700: 2 x 6.8 L

-or-

***OcTTain XL*(PCP#30077):** 90 g/L fluroxypyr plus 360 g/L 2,4-D LV ester.
Container size - 2 x 9 L, 108L, 432 L bulk

All products above are formulated as emulsifiable concentrates.

Crops and Staging:

Spring wheat (including durum), barley:
4 leaf up to the emergence of the flag leaf.

Winter wheat: Apply to winter wheat in the spring from the 3 tiller stage to just before the flag leaf stage. (*Attain XC* and *OcTTain XL* only)

Forage Grasses for seed production only*:
Seedling and established grasses at the 4 leaf up to the emergence of the flag leaf.

Bromegrass
(meadow, smooth)
Fescue (creeping red, tall)
Timothy
Wheatgrass
(crested, intermediate)

* *NOTE: Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance.* ***Those who apply these uses do so at their own risk.***

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds, Rates and Staging:

The following weeds are controlled at the 2 to 4 leaf stage, unless otherwise specified:

***Attain XC A* 95 mL/acre plus *Attain XC B* 260 mL/acre or; *Fluroxypyr 180* at 180 mL/acre plus *2,4-D Ester 700* at 260 mL/acre**
(53 acres per case) controls the following weeds:

Bluebur
Burdock
Cleavers (1 to 6 whorls)
Clover (sweet)
Cocklebur
Field horsetail*
Flixweed
Goat's beard
Hoary cress*
Kochia
Lamb's-quarters
Mustards (except dog and tansy)
Plantain
Prickly lettuce
Ragweed
Shepherd's purse
Stinkweed
Sunflower (annual)
Vetch
Volunteer canola
Wild radish
Wild mustard
Wild buckwheat (1-6 leaf)

***Attain XC A* at 0.13 L/acre plus *Attain XC B* at 0.34 L/acre (40 acres per case) or ;**
***Fluroxypyr 180* at 0.24 L/acre plus *2,4-D Ester 700* at 0.34 L/acre (40 acres per case) or;**
***OcTTain XL* at 0.45 L per acre (one 2 x 9 L case treats 40 acres, 108 L treats 250 acres and 576 L treats 1280 acres)**
Controls the weeds listed above plus:

- Annual sow-thistle†Δ
- Blue lettuce*Δ
- Canada thistle*†Δ
- Cleavers (1-8 whorls)
- Common chickweed up to 3 inches (8 cm) in height†
- Dandelion**Δ
- DocksΔ
- Dog mustardΔ
- Field bindweed*Δ
- Field peppergrassΔ
- GumweedΔ
- Hairy galinsogaΔ
- Hedge bindweedΔ
- Hemp-nettle (2 to 6 leaf stage) †††
- Leafy spurge*Δ
- Oak-leaved goosefoot Δ
- Perennial sow thistle*†
- Redroot pigweed ††
- Round-leaved mallow (1 to 6 leaf)
- Russian thistleΔ
- Smartweed (including Lady's-thumb)Δ
- Stork's-bill (1 to 8 leaf)
- TansyΔ
- Tartary buckwheatΔ
- Volunteer flax (1 to 12cm)
- Wild buckwheat (1 to 4 leaf, 1 to 8 leaf with *Attain XC* and *OcTTain XL* only)

Δ *Attain XC* and *Flurox 2,4* only or *OcTTain XL* mixed with *2,4-D ester* (LV 700 at 81 mL/acre or LV600 at 95 mL/acre).

† Suppression only

†† Suppression only with *OcTTain XL*, unless mixed with *2,4-D ester* (LV 700 at 81 mL/acre or LV600 at 95 mL/acre).

††† Control with *OcTTain XL*, suppression with other products.

* Top growth only

** Spring rosettes only.

Make only one application per year of any of these products or other products containing the same active ingredients.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume:

Ground: *Attain XC* and *OcTTain XL* use 20 to 40 L per acre. All other uses minimum 40 L per acre.

Aerial: *Attain XC* and *OcTTain XL* only use 12-20 L per acre. Consult label for buffer zone.

Nozzles and Pressure: Maximum 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE coarse*** droplets.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

The activity these products are influenced by weather conditions. The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after application may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions (drought, heat or cold stress) or if extremely heavy infestations exist.

Tank Mixes:

Herbicides:
The following mixes may be used with each of the combinations above unless noted otherwise.

In spring wheat (including durum) and barley:
Liquid Achieve (0.2 L/acre) plus *Turbocharge* adjuvant*
Assert (0.53 to 0.65 L/acre)

In spring wheat (including durum) only:
Clodinafop 240EC† (93 mL/acre) plus *Score* adjuvant†
Puma^{120} Super (0.16 to 0.31 L/acre)
Everest 70 WDG (17.4 g/acre) plus recommended surfactant
Simplicity (0.15 to 0.20 L per acre)††

Fertilizer: None registered.

Insecticides: None registered.

Fungicides: None registered.

* Temporary crop injury (*Achieve* only) or reduced wild oat control may occur with this tank mix.

† *Signal* and *Foothills* with *Attain XC* and *OcTTain* only. *Horizon* may be mixed with all products.

†† Low rate of *Attain XC* or *OcTTain XL* without additional *2,4-D ester* only.

Note: The above mixes are those listed on the *Attain XC*, *Flurox 2,4* and *OcTTain* labels only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Manufacturers may also support mixes between their products and other pesticides that are not on their labels. Check with each manufacturer for the products they support. Mixes must be applied according to the most restrictive use limitations for all products added to the tank.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall:
Attain XC* and *Flurox 2,4: Within 2 hours will reduce control.
OcTTain XL: Wet foliage at application will reduce control.

Grazing: DO NOT permit lactating dairy animals to graze cereal fields within 7 days of application. DO NOT harvest cereal crops for forage or cut hay within 30 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.

DO NOT feed or cut forage grasses for hay

Preharvest Interval: Leave 60 days between application and harvest.

Re-cropping: Barley, canola, flax, forage grasses, lentils, mustard, oats, peas, rye, and wheat, may be grown the year after application. There are no re-cropping restrictions the second year after application.

Aerial Application: *Attain XC* and *OcTTain XL* may be applied by air.

Storage: Avoid freezing. If frozen, bring to room temperature and agitate before use. These products are combustible. DO NOT store near heat or open flame.

Buffer Zones:

Flurox 2,4: Leave a buffer of 15 meters from water bodies, wetland areas and plants that may be injured.

***Attain XC*:**

Application method	Buffer Zones (metres[†]) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only[*]	1	1	3
Fixed wing aircraft	6	0	100
Helicopter	6	0	80

***OcTTain XL* only:**

Application method	Buffer Zones (metres[†]) Required for the Protection of:		
	Freshwater Habitat of Depths:		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Field sprayer	1	0	1
Fixed wing aircraft	1	0	55
Helicopter	1	0	45

See the key to product pages on page 27 for an explanation of the different habitats.

[*] Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

[†] Distance is measured from the downwind edge of the boom to sensitive areas.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Danger – Poison.

◇ Warning – Eye Irritant.

▽ Caution – Skin Irritant.

For an explanation of the symbols used here see page 11.

Fortress

Herbicide Group
3 - trifluralin
8 - triallate
(Refer to page 38)

Company:

Gowan Canada (PCP#19521)

Formulation:

10% triallate and 4% trifluralin formulated as a granular.

Container size - 22.7 kg bag, 454 kg container.

Crops and Staging:

Prior to planting wheat (spring and durum), barley, canola, flax (not including Solin), mustard.

Preplant incorporated: In fall after September 15 until soil freeze-up or in the spring prior to seeding crop.

Surface application: Apply in the fall after October 1 and when soil temperature is less than 4°C at a depth of 2 inches (5 cm) and delay incorporation until the following spring.

DO NOT apply to fields with heavy trash cover or after snow has fallen. Some wheat or barley injury may be noted on eroded knolls.

Weeds and Staging:

Pre-emergent control of wild oats, green foxtail, yellow foxtail.

Suppression of lamb's-quarters, kochia, redroot pigweed, Russian thistle, wild buckwheat.

Rates:

Apply *Fortress* according to soil organic matter content.

ORGANIC MATTER	RATE (KG/ACRE)					
	RAPESEED (CANOLA), FLAX***, MUSTARD		BARLEY		SPRING WHEAT AND DURUM WHEAT	
	Spring	Fall	Spring	Fall	Spring	Fall
< 2%	5.67	5.67	N.R.*	4.45	N.R.*	N.R.*
2 -4%	5.67	5.67	4.45	5.67	N.R.*	4.45
4 -6%	6.88	5.67	5.67	5.67	4.45	5.67
> 6%	6.88	6.88	6.88	6.88	5.67	5.67**

* N.R. -Not Recommended.

** For fall incorporated applications (not surface) apply 6.88 kg/acre when organic matter exceeds 8 percent.

*** Excluding Solin (low linolenic acid flax).

Application Information:

Fortress may be applied in the fall with or without a fall tillage operation, or in the spring as a preplant incorporated treatment. Before application of this product, the soil must be in good working condition. Application to a field that is wet, lumpy, rough or ridged will result in reduced weed control and promote crop thinning.

Fall Surface Application: Where fields are prone to water and/or wind erosion, and tillage is therefore undesirable, fall surface application should be made within 3 weeks of soil freeze-up, when the soil begins to cool (less than 4°C), which typically begins on or around October 1. Application can be made to standing stubble or to previously worked fields with incorporation delayed until spring. For best results on heavy wild oat infestations, use the incorporated treatment.

Fall Incorporated Application: *Fortress* must be applied after September 15 and before soil freeze-up. Application prior to September 15 may result in reduced weed control. Initial incorporation may be completed within 24 hours of application. The second incorporation may be done in the fall (prior to soil freeze-up) or in the spring prior to, or after, seeding. If performed after seeding, it must be completed with harrows prior to emergence of the crop. Fall incorporation is not recommended on soils where a lack of trash cover combined with the required incorporation operation could result in soil erosion.

Spring Application: *Fortress* can be applied before seeding but must be incorporated within 24 hours of application. The second incorporation must be delayed at least 48 hours after the first and may be performed at any time prior to crop emergence.

Incorporation:

Fortress applications require two incorporations, with the second incorporation at right angles to the first. Seeding with a seeder that provides soil disturbance equivalent to a cultivator may replace one incorporation. Incorporate to a maximum depth of 2 inches (5 cm) by setting disk or cultivator implements to cut a maximum of 3 inches (7.5 cm) into the soil. Mixing the product to greater depths will dilute the herbicide, decrease wild oat control, and may cause injury to cereals. If the second incorporation is conducted after seeding, it should be done with harrows or other suitable tillage equipment adjusted so as not to disturb the seed. Harrowing does not provide effective incorporation if compact soil prevents penetration of harrow teeth, if trash accumulates in the harrow sections, or if the harrows bounce.

Seeding Requirements: Accurate seeding depth control is critical. Thinning of wheat and barley has been known to occur when seeding depth has been inadequate. Ensure that cereals are seeded below the treated layer (2 to 3 inches or 5 to 7.5 cm). Do not seed deeper than 3 inches (7.5 cm). To ensure an even crop stand, increase the usual seeding rate of wheat or barley by 10 percent, especially if soil conditions are cold or dry. See product label for more information.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Crop injury can occur on fields where *Fortress* has been applied and heavy rainfall or cold weather occur after seeding but prior to crop emergence. Seeding under warm soil conditions (greater than 10°C and generally after May 15) will ensure optimum crop germination and emergence and will reduce the risk of crop injury. Very dry conditions in spring or prolonged cool soil temperatures at time of wild oat germination will result in reduced control. Poor results may be expected from incomplete incorporation due to wet, cloddy soil or heavy trash. Ridges left at seeding may disrupt the treated layer and allow weed escapes.

Restrictions:

Rainfall: Moisture is required for activation. Rainfall of at least 0.6 inches (1.5 cm) within 2 weeks of seeding is required to ensure optimum results.

Re-entry: DO NOT enter treated fields for at least 12 hour

Grazing: DO NOT graze or cut treated crops for livestock feed prior to crop maturity.

Re-cropping: *Fortress* will leave a residue in the soil. Oats, canaryseed, and small seeded forage grasses may be injured if planted within 24 months of application. DO NOT apply *Fortress* on land to be sown to wheat if the land has been treated with trifluralin since June 1 of the previous year.

Aerial Application: May be applied by airplane with attachments designed for applying low volumes of granules.

Storage: Store in a cool, dry place.

Hazard Rating:

⚠ Warning – contains the allergen soy.

May cause Skin and Eye Irritation

For an explanation of the symbols used here see page 11.

Frontier Max

Herbicide Group
15 - dimethanamid
(Refer to page 38)

Company:

BASF Canada (PCP# 29194)

Formulation:

720 g/L dimethanamid-P formulated as an emulsifiable concentrate.
Container size - 3 L to 1000 L.

Crops and Staging:

Pre-plant incorporated:
Corn (**NOT** sweet corn, popcorn, or corn grown for seed).
Dry beans (white and kidney beans only).

Pre-emergence surface:
Dry beans (white and kidney beans only).

Weeds and Staging:

Pre-emergent control of green foxtail.

Rates:

Pre-plant incorporated treatments:
Apply at 0.35 to 0.39 L per acre. Apply at the higher rate on fine-textured or high organic soils and for heavier anticipated weed problems.

Pre-emergence surface treatments:

SOIL TYPE (Texture)	RATE (L PER ACRE)		
	Less than 3% Organic Matter	3 to 6% Organic Matter	7 to 10% Organic Matter
Coarse	0.31	0.31	0.35
Medium and Fine	0.31	0.35	0.39

Application Information:

Water Volume: A minimum of 40 L per acre.

Pressure: 30 to 43 psi (200 to 300 kPa).

Nozzles: Flat fan or flood-jet. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of *ASABE **medium*** droplets. Use 16 mesh suction screen, 50 mesh elsewhere on sprayer.

Incorporation: For pre-plant incorporated treatments, apply *Frontier Max* as a broadcast treatment and incorporate using a harrow, rolling cultivator or other implement capable of giving uniform, shallow incorporation into the top 5 cm (2 inches) of soil within 7 days of planting. Avoid deeper incorporation or reduced weed control and/or crop injury may result. Immediate incorporation after application is not necessary.

Beans must be planted at least 4 cm (1.5 inches) deep or crop injury may occur.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Rainfall is required within 7 to 10 days of application to activate and move *Frontier Max* into the soil zone. If dry conditions persist, a shallow cultivation or the use of a rotary hoe is necessary to move the herbicide into moist soil and control weed escapes. Shallow tillage is important to minimize dilution of the herbicide. If drought conditions persist after pre-plant incorporated or pre-emergence applications, weed control may not be adequate.

Tank Mixes:

Herbicides: None registered.

Fertilizers: May be applied with a liquid fertilizer carrier. Test compatibility with liquid fertilizer by mixing a small amount of herbicide with a proportional quantity of liquid fertilizer in a jar. May also be impregnated on dry bulk fertilizers for pre-plant incorporated treatments. A minimum of 90 kg/acre of dry bulk fertilizer should be applied. DO NOT impregnate *Frontier Max* on nitrate fertilizers, superphosphates or limestone.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Rainfall after application is important for good weed control.

Re-entry: DO NOT enter treated fields for 24 hours.

Grazing: DO NOT graze or feed the treated corn crop within 40 days of application. DO NOT graze the treated bean crop or feed bean forage, hay or straw to livestock.

Re-cropping: DO NOT plant winter wheat within 120 days of application.

Aerial Application: DO NOT apply by air.

Storage: DO NOT freeze. Must be stored under heated warehouse conditions.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	3

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

The manufacturer does not provide information on tank cleaning. Generally, a mixture of water and household ammonia (1 L per 100 L of water) flushed twice through the tank and circulated through the lines and nozzles is an effective method of cleaning the sprayer tank.

Hazard Rating:

☠ Caution – Poison.

⚠ Warning – Eye Irritant and Potential Skin Sensitizer.

For an explanation of the symbols used here see page 11.

Frontline 2,4-D XC

Herbicide Group
2 - florasulam
4 - 2,4-D
(Refer to page 38)

Company:

Dow AgroSciences

Formulation:

The *Frontline 2,4-D XC* package has 2 components:

***Frontline 2,4-D XC A* (PCP#30060):** 50 g/L florasulam formulated as a suspension concentrate

***Frontline 2,4-D XC B* (PCP#30061):** 660 g/L 2,4-D LV ester formulated as an emulsifiable concentrate.

Container sizes:

Frontline 2,4-D XC A: 1.6 L.
Frontline 2,4-D XC B: 2 x 6.8 L

Crops and Staging:

Spring wheat (including durum) - 3rd leaf fully expanded to 6 leaf stage.

When mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Broadleaf weeds controlled at the 2 to 4 leaf stage:

Bluebur
Burdock
Chickweed
Cleavers
Cocklebur
Dandelion*
Flixweed
Kochia** ††
Lady's-thumb
Lamb's-quarters
Mustard (ball, wild)
Narrow-leaved hawk's-beard***
Plantain
Prickly lettuce
Ragweed (common)
Redroot pigweed
Russian thistle
Shepherd's-purse
Smartweed
Sow-thistle (annual)
Stinkweed
Sunflower (annual)
Tartary buckwheat
Vetch
Volunteer canola†
Wild buckwheat
Wild radish

Broadleaf weeds suppressed:

Canada thistle (top growth control only)
Hemp-nettle
Perennial sow-thistle (top growth control only)

* Seedlings and overwintered rosettes
** Up to 5 cm (2 inches) in height.
*** Up to 2 leaf stage.
† Including all herbicide-tolerant canola varieties

Note: Surveys of fields with kochia have found that roughly 90% of these kochia populations were resistant to Group 2 herbicides. Without testing that confirms otherwise, assume that kochia in your field is likely resistant as well and is unlikely to be controlled by Frontline 2,4-D *alone at the stages given (see 2,4-D pages for kochia staging).*

Rates:

Frontline 2,4-D XC A: 40 mL per acre

Frontline 2,4-D XC B: 0.34 L (340 mL) per acre.

One package treats 40 acres.

Maximum one application of this product or other products containing florasulam per season.

Refer to the product label for complete mixing instructions for this product and its mixes.

A general guide to mixing can be found on page 13 of the *Guide to Crop Protection.*

Application Information:

Water Volume: 40 L per acre.

Nozzles and Pressure: Maximum 30 to 40 psi (200 to 275 kPa) with conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver thorough, even coverage with ***ASABE coarse*** droplets.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Warm, moist growing conditions promote active weed growth and enhance activity of *Frontline 2,4-D.* Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur. Under conditions of low crop and high weed density, control may be reduced. Extreme growing conditions such as drought or near freezing temperature prior to, at, or following time of application may reduce weed control and increase the risk of crop injury at all stages of growth.

Tank Mixes:

Herbicides:

In spring wheat (including durum):

Assert 300 SC (0.65 L/acre) plus *Acidulate*

Everest 70WDG (17.4 g/acre) plus recommended surfactant.

Puma^{120} Super (0.154 L/acre)

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the *Frontline 2,4-D XC* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT allow lactating dairy animals to graze treated areas within 7 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter. DO NOT harvest forage or cut hay within 30 days of application.

Preharvest Interval: Leave 60 days between application and harvesting mature crop.

Re-cropping: Wheat, barley, canola, oats and peas may be grown the year following an application.

Aerial Application: DO NOT apply by air.

Storage: Store in dry, heated area. If frozen, bring to room temperature and agitate before use.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	5	5	30

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

◈ Warning – Poison

▽ May cause skin and eye irritation.

For an explanation of the symbols used here see page 11.

Frontline XL

Herbicide Group
2 - florasulam
4 - MCPA
(Refer to page 38)

Company:

Dow AgroSciences (PCP#28804)

Formulation:

4 g/L florasulam and 280 g/L MCPA ester formulated as an emulsifiable concentrate.

Container size - 2 x 10 L

Crops and Staging:

Spring wheat (including durum), barley and oats in the 2 to 6 leaf stage.

When tank-mixing, always check the tankmix partner recommendations for additional staging restrictions.

Weeds and Staging:

Broadleaf weeds controlled at the 2 to 4 leaf stage:

Ball mustard
Burdock**
Chickweed
Cleavers
Flixweed
Hemp-nettle◊
Lamb's-quarters
Prickly lettuce**
Ragweed (common)
Redroot pigweed◊
Russian pigweed**
Shepherd's-purse
Smartweed
Stinkweed
Sunflower (annual)**
Volunteer canola*
Wild mustard
Wild buckwheat

Broadleaf weeds suppressed:

Canada thistle†
Dandelion***
Plantain†
Stork's-bill◊
Sow-thistle (annual)
Sow-thistle (perennial)†

* including all herbicide-tolerant canola varieties
** up to the 4 leaf stage of development
*** seedlings and overwintered rosettes less than 15 cm (6 inches)
◊ for improved control of this weed add an additional 57 ml per acre of *MCPA LV500 (Frontline B)*
† top growth control

Rate:

0.5 L per acre

One case treats 40 acres. Maximum one application of this product or other products with the same ingredients per season.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: A minimum of 40 L per acre.

Nozzles and Pressure: Maximum 30 to 40 psi (200 to 275 kPa) with conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver thorough, even coverage with ***ASABE coarse*** droplets.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Warm, moist growing conditions promote active weed growth and enhance activity of *Frontline XL*. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur. Under conditions of low crop and high weed density, control may be reduced. Extreme growing conditions such as drought or near freezing temperature prior to, at or following time of application may increase the risk of crop injury at all stages of growth.

Tank Mixes:

Herbicides:

In spring wheat (including durum) and barley only:

Assert (0.65 L/acre) plus *Acidulate*.

In spring wheat (including durum) only:

Horizon 240EC (93 or 117mL/acre) plus *Score* adjuvant.

Everest 70 WDG at 17.4 g/acre plus *Ag-Surf* or *Agral 90* adjuvant.

In spring wheat (NOT including durum) and barley only:

*Axial 100EC**(0.24 L/acre) plus *Adigor* adjuvant.

* This tank mix may result in reduced levels of green foxtail control.

Insecticides: None registered.

Fungicides: None registered.

Fertilizers: None registered.

Note: The above mixes are those listed on the *Frontline XL* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Dow AgroSciences also supports the following mixes that are not on the *Frontline XL* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides: *Assert plus ½ rate Puma^{120} Super, Avenge, clodinafop (Signal and NextStep)*

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Re-Entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT allow lactating animals to graze treated crop or cut for feed or hay within 7 days of application. Withdraw meat animals from treated feed 3 days prior to marketing.

Preharvest Interval: DO NOT apply within 60 days of harvest.

Re-cropping: Wheat, barley, oats, canola and peas may be grown the year following an application.

Aerial Application: DO NOT apply by air.

Storage: Store in dry, heated area. If frozen, bring to room temperature and agitate before use.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	5	5	30

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

⚠ Warning – Potential skin sensitizer.

May cause eye and skin irritation irritation.

For an explanation of the symbols used here see page 11.

Glyphosate

Herbicide Group
9 - glyphosate
(Refer to page 38)

Product names, Company, Formulation and Package sizes:

All products are formulated as solutions.

Product Name	Company	Salt type*	Active** content (g a.e. /L)	Package sizes***
Cheminova Glyphosate (PCP#26828)	Cheminova	IPA	356	1, 2, 3, 6
ClearOut 41 Plus (PCP#28322)	Farmers of North America	IPA	360	2, 6
Credit 45 (PCP#29124)	Nufarm Agriculture	IPA	450	1, 2, 6
Crush'R Plus (PCP#29995)	AgWest	IPA	360	1, 2, 3
Factor 540 (PCP#27988)	IPCO	K+	540	1, 2, 3, 6
Glyfos (PCP#24359)	Cheminova	IPA	360	1,4
Glyphogan (PCP#29219)	MANA Canada	K+	356	1, 2, 3, 6
Knockout Extra (PCP#29266)	Great Northern Growers	IPA	360	1,2,5
Lajj Plus (PCP#29677)	Ray Glenn Commodities	IPA	360	1, 2
Matrix (PCP#29775)	IPCO	DMA	480	1, 6
Maverick III (PCP#28977)	Dow AgroSciences	DMA	480	1, 2, 3, 9
MPower Glyphosate (PCP#29290)	Farmers of North America	IPA	360	2, 4, 6
NuGlo (PCP#29470)	Nufarm Agriculture	IPA	450	3, 6
Polaris (PCP#29479)	E.I. DuPont Canada	IPA	360	1, 2, 3, 8
Roundup Transorb HC (PCP#28198)	Monsanto	K+	540	1, 2, 3, 6
Roundup Ultra 2 (PCP#28486)	Monsanto	K+	540	1, 2, 3, 8
Roundup WeatherMax (PCP#27487)	Monsanto	K+	540	1, 2, 3, 8
R/T 540 (PCP#28487)	Monsanto	K+	540	2, 5, 6
Sharpshooter (PCP#28631)	UAP	IPA	356	2, 5, 6
Sharpshooter Plus (PCP#28623)	UAP	IPA	360	1, 2, 3, 4
Start Up (PCP#29498)	Viterra	K+	540	1, 2, 3
Touchdown Total (PCP#28072)	Syngenta Canada	K+	500	1,2,3,6
Traxion (PCP#29201)	Syngenta Canada	K+	500	1, 2, 3
Vantage Plus Max II (PCP#28840)	Dow AgroSciences	DMA	480	2, 6, 9
Wise-Up (PCP#29126)	Adjuvants Plus	IPA	356	2, 5

* Salt type: IPA = Isopropylamine, MA = Monoammonium, DA = Diammonium, DMA = dimethylamine, K+ = Potassium

** Formulation concentration is expressed as "grams of acid equivalent per litre of product (g a.e./L). Glyphosate acid is the herbicidally active component of the formulation and is proportional to the activity of the formulation Note: Some products may be more effective due to formulation differences (not related to higher glyphosate content) under adverse conditions, but that benefit is reduced when applications are made under optimal conditions for activity (i.e. rapid weed growth, clean leaf surfaces). When selecting a glyphosate product, consult the product

*** Container sizes available: 1) 2 x 10 L or 1 x 20L, 2) 115 L, 3) 450 L, 4) 667 L, 5) 750 L, 6) 1000 L, 7) 1200 L, 8) 1150 L, 9) 960 L

Crops and Uses:

1. Annual weed control prior to crop emergence or in summerfallow.
2. Quackgrass control prior to seeding or after harvest.
3. Dandelion control (other than Preharvest).
4. Canada thistle control in summer-fallow, shelterbelts and post-harvest.
5. Alfalfa control (other than Preharvest).
6. Other perennial weeds control in summerfallow, shelterbelts and post-harvest.
7. Patch treatments of perennial weeds in cereals, corn, soybean and forages.
8. Preharvest perennial weed control.
9. For use in Glyphosate tolerant crops.
10. Tank Mixes.

1. Annual weed control prior to crop emergence or in summer-fallow:

Weeds listed may not occur on all product labels. Check individual product labels for a specific list of weeds controlled.

FORMULATIONS	RATE/ACRE	SURFACTANT*	WEEDS CONTROLLED	WEED STAGE
356-360 g/L	0.30 L	0.14 L/acre	**Grasses:** Green foxtail, volunteer cereals, wild oat (light infestations) **Broadleaves:** lady's-thumb, stinkweed, volunteer canola (NOT including glyphosate tolerant varieties), wild mustard.	Less than 3 inches (8 cm) high. Apply at the 1 to 3 leaf stage of wild oat.
450 g/L	0.24 L			
480 g/L	0.23 L			
500 and 540 g/L	0.20 L			
356-360 g/L	0.40 L	0.14 L/acre	*Above weeds plus:* **Grasses:** heavy infestations of wild oat. **Broadleaves:** suppression of flixweed, kochia.	1 to 3 leaves for wild oat Weeds 3 to 6 inches (8 to 15 cm).
450 g/L	0.32 L			
480 g/L	0.3 L			
500 g/L	0.28			
540 g/L	0.27 L			
356-360 g/L	0.51 t0 0.77 L	Not required	*Above weeds plus:* **Grasses:** downy brome, Persian darnel. **Broadleaves:** Canada fleabane, cleavers, common ragweed, flixweed, hemp-nettle, lamb's-quarters, narrow-leaved hawk's-beard, redroot pigweed, Russian thistle, volunteer flax, wild buckwheat.	Canada fleabane, common ragweed, less than 3 inches (8 cm) high. Other weeds less than 6 inches (15 cm). Use high rate for narrow-leaved hawk's-beard 3 to 6 inches (8- 15 cm) or wild buckwheat at the 3-4 leaf stage.
450 g/L	0.40 to 0.61 L			
480 g/L	0.38 to 0.57 L			
500 g/L	0.36 to 0.54 L			
540 g/L	0.33 to 0.51 L			
356-360 g/L	0.91 L	Not required	*Above weeds plus:* **Grasses:** annual blue grass, crabgrass. **Broadleaves:** annual sow-thistle, kochia, prickly lettuce, shepherd's-purse, narrow-leaved vetch.	Less than 6 inches (15 cm) high
450 g/L	0.73 L			
480 g/L	0.68 L			
500 g/L	0.65 L			
540 g/L	0.61 L			
356-360 g/L	1.42 L	Not required	*Above weeds.*	Greater than 6 inches (15 cm) high
450 g/L	1.13 L			
480 g/L	1.1 L			
500 g/L	1.0 L			
540 g/L	0.94 L			

* Unless otherwise specified, use one of the following surfactants: *Agral 90, Agsurf, Companion,or LI 700.*

2. Quackgrass control prior to seeding or after harvest:

FORMULATIONS	RATE PER ACRE	QUACK GRASS STAGE
356-360 g/L	1.0 L	Season long control of light to moderate infestations. Apply when quack grass is 8 inches (20 cm) tall and has 3 to 4 actively growing leaves. Apply spring or fall.
450 g/L	0.81 L	
480 g/L	0.76 L	
500 g/L	0.73 L	
540 g/L	0.67 L	
356-360 g/L	1.0 to 2.8 L	Apply when quack grass has 3 to 4 new leaves for long term control of heavy infestations. Use high rate for sod-bound quack grass (left undisturbed for at least 2 years).
450 g/L	0.81 to 2.27 L	
480 g/L	0.76 to 2.13 L	
500 g/L	0.73 to 2.02 L	
540 g/L	0.67 to 1.89 L	

DO NOT apply fall treatments if a hard frost has occurred (-5°C) or if plants are drought stressed. Spread straw to allow regrowth and good spray coverage.

Cultivation prior to application will result in reduced control. DO NOT cultivate between harvest and treatment when using fall applications. If using spring applications on fields which have been fall-tilled, delay application until the quack grass has reached the 4 to 5 leaf stage. (This will occur 1 to 4 weeks later on fall-tilled fields than in undisturbed fields).

Cultivation after application usually will improve control of quack grass. Wait a minimum of 3 days after application before cultivating. If growing conditions are poor (cold or dry), particularly in the fall, waiting longer than 5 days may improve control.

3. Dandelion control (other than Preharvest):

Apply up to and including dandelion bloom for best results.

FORMULATIONS	Less than 6 inches (15 cm) diameter. Allow 3 or more days after treatment before tillage.	Greater than 6 inches (15 cm) diameter. Use higher rate when infestations are heavy.
356-360 g/L	1.0 L/acre	1.5 to 2.0 L/acre
450 g/L	0.81 L/acre	1.21 to 1.62 L
480 g/L	0.76 L/acre	1.13 to 1.5 L/acre
500 g/L	0.73 L/acre	1.09 to 1.46 L/acre
540 g/L	0.67 L/acre	1.0 to 1.34 L/acre

4. Canada thistle control in summer-fallow, shelterbelts and post-harvest:

FORMULATION	RATE PER ACRE	WEED STAGING
356-360 g/L	1.9 to 2.8 L	Bud stage or beyond. Allow at least 5 days after application before tillage.
450 g/L	1.54 to 2.27 L	
480 g/L	1.44 to 2.13 L	
500 g/L	1.38 to 2.02 L	
540 g/L	1.28 to 1.89 L	
356-360 g/L	1.0 L	Rosettes at least 6 inches (15 cm) in diameter, treated in late summer, following tillage in spring and early summer (up to August 1). Allow thistles to regrow for 5 weeks following last tillage. Wait a minimum of 10 days after application before tillage. Treatment after a mild frost is possible if leaves are green and pliable and plants are actively growing.
450 g/L	0.81 L	
480 g/L	0.76 L	
500 g/L	0.73 L	
540 g/L	0.67 L	
356-360 g/L	1.9 to 2.8 L	Post-harvest stubble treatment. Allow 8 to 10 inches (20 to 25 cm) of new growth before application. Must be sprayed at least 2 weeks prior to killing frost. Straw should be removed or evenly spread to allow for proper regrowth and spray coverage.
450 g/L	1.54 to 2.27 L	
480 g/L	1.44 to 2.13 L	
500 g/L	1.38 to 2.02 L	
540 g/L	1.28 to 1.89 L	

5. Alfalfa Control (other than Preharvest):

FORMULATION	RATE PER ACRE	WEED STAGING
356-360 g/L	1.50 to 2.00 L	Fall control of alfalfa in early bud to full bloom stage. Use high rate when alfalfa populations are high or when perennial grasses are present. Allow at least 5 days before tillage. See tank mix section for minimum tillage or spring applications. Apply with 23 to 135 L per acre water.
450 g/L	1.21 to 1.62 L	
480 g/L	1.13 to 1.52 L	
500 g/L	1.09 to 1.46 L	
540 g/L	1.00 to 1.34 L	
Touchdown Total and *Traxion* only (500 g/L)	0.65 to 1.30 L	Prior to seeding or after harvest. Use higher rate for weeds beyond 3 inches (8 cm) in height or for heavy weed infestations. Wait 7 days after application for tillage. Apply in 23 to 135 L per acre water.

6. Other perennial weed control in summerfallow, shelterbelts and post-harvest:

(Refer to individual product labels for detailed application information.)

FORMULATIONS	RATES IN UNITS PER ACRE			
	Foxtail Barley		Toadflax (vegetative stage in summer fallow)	Other Perennial weeds**
	Suppression only	Seedling to heading*		
356-360 g/L	–	1.0 to 2.0 L	1.0 L	2.8 to 4.9 L
450 g/L	–	0.81 to 1.62 L	0.81 L	2.27 to 3.88 L
480 g/L	–	0.76 to 1.5 L	0.76 L	2.13 to 3.6 L
500 g/L	0.28 L***	0.73 to 1.46 L	0.73 L	2.02 to 3.48 L
540 g/L	–	0.67 to 1.34 L	0.67 L	1.89 to 3.24 L

* Late fall applications may provide better control of established foxtail barley plants than spring applications.

** Perennial weeds such as absinthe, blue grass spp., smooth brome grass, cattail, curled dock, field bindweed (bloom stage or beyond), hemp dogbane, hoary cress, poison ivy, purple loosestrife, perennial sow-thistle, and yellow nutsedge applied at the early heading to early bud stage.

*** *Touchdown Total and Traxion* only.

7. Patch treatments of perennial weeds in wheat, oat, barley, corn, soybean, forage legumes and forage grasses:

(Refer to individual product labels for detailed application instructions)

FORMULATIONS	RATES PER ACRE				
	Quack grass 8 in (20 cm) tall	Canada thistle Bud or beyond	Milkweed Bud to bloom	Other perennial weeds*	Spot treatment rates for hand held equipment (per 10 L water**)
356-360 g/L	1.0 to 2.8 L	1.9 to 2.8 L	4.9 L	2.8 to 4.9 L	100 to 200 mL
450 g/L	0.81 to 2.27 L	1.54 to 2.27 L	0.81 L	2.27 to 3.89 L	100 to 200 mL
480 g/L	0.76 to 2.13 L	1.44 to 2.13 L	3.6 L	2.13 to 3.6 L	76 to 152 mL
500 g/L	0.73 to 2.02 L	1.38 to 2.02 L	3.48 L	2.02 to 3.48 L	73 to 146 mL
540 g/L	0.67 to 1.89 L	1.28 to 1.89 L	3.24 L	1.89 to 3.24 L	67 to 134 mL

* Perennial weeds such as absinthe, blue grass spp., smooth brome grass, cattail, curled dock, field bindweed (bloom stage or beyond), hemp dogbane, hoary cress, poison ivy, purple loosestrife, perennial sow-thistle, and yellow nutsedge applied at the early heading to early bud stage.

** Use the low rate for quack grass and the high rate for all other perennials.

8. Preharvest perennial weed control:

DO NOT apply to any crops grown for seed.

Not all glyphosate products are registered for Preharvest applications on all crop species listed below. Refer to specific glyphosate labels for a list of registered uses and crop species.

Crops registered and rates (per acre):

FORMULATION	Barley*, bean (dry), canola, field pea, flax (including solin), lentil, oat*, soybean, wheat.	Chickpea**, lupin**, faba bean**, Mustard*** (Yellow/ white, brown, oriental)	Forages
356-360 g/L	1.0 L	–	1.0 to 2.0 L
450 g/L	0.81 L	–	0.81 L to 1.62 L
480 g/L	0.76 L	–	0.76 to 1.52 L
500 g/L	0.73 L	–	0.73 to 1.46 L
540 g/L	0.67 L	0.67 L	0.67 to 1.34 L

* Registered for application to barley grown for malt and tame oat grown for milling. Contact malt barley or milling oat buyers prior to application to confirm acceptance of glyphosate-treated grain.

** Preharvest applications on these crops are registered with *Roundup Transorb HC, Roundup WeatherMax, R/T 540, Roundup Ultra 2* and *StartUp* only. *NOTE: Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance.* ***Those who apply glyphosate to chickpea, lupin or fababean, do so at their own risk.***

*** Pre-harvest application registered with *Roundup WeatherMAX* .

Weeds Controlled with Preharvest applications:

Quack grass 4-5 green leaves	Canada thistle and perennial sow-thistle at bud stage or beyond	Common milkweed at bud to bloom stage	Toadflax at bud to full bloom stage	Dandelion from rosette to full bloom stage
X	X	X	X	X

Crop Staging for Preharvest applications:

Apply to crops (except forage) when grain moisture is less than 30%. The following chart lists visual symptoms that can be used as guidelines to when 30% grain moisture has been reached.

CROP*	VISUAL SYMPTOMS
Wheat, Barley, Oat	Hard dough stage – a thumbnail impression remains on seed.
Canola, Mustard ***	Pods are green to yellow and most seeds are yellow to brown.
Flax (including Solin)	Majority (75 to 80% of bolls) are brown.
Lentil	Lowermost pods (bottom 15%) are brown and rattle when shaken.
Pea	Majority (75 to 80%) of pods are brown.
Chickpea**	Stems are green to brown in colour: pods are mature (yellow to brown in colour); 80%-90% leaf drop (original leaves).
Lupin**	Stems are green to brown in colour: pods are mature (yellow to brown in colour); 80%-90% leaf drop (original leaves).
Faba bean**	Stems are green to brown in colour: pods are mature (yellow to brown in colour); 80%-90% leaf drop (original leaves).
Soybean	Stems are green to brown in colour and pod tissue is brown and dry in appearance (80 to 90% leaf drop).
Dry Bean	Stems are green to brown in colour and pods are mature (yellow to brown) and 80 to 90% of the original leaves have dropped.
Forage	3 to 7 days prior to the last cut before rotation or forage renovation. DO NOT apply to forage stands that are to be maintained.

* Not all glyphosate products are registered for Preharvest application on all crops species listed above. Refer to individual crop labels for a list of registered uses and crop species.

** Preharvest applications on these crops are registered with *Roundup Transorb HC, Roundup WeatherMax, R/T 540, StartUp* and *Roundup Ultra 2* only.

*** *RoundUp Weather Max* only.

9. For use in glyphosate tolerant crops:

Glyphosate tolerant canola:

Weeds, Staging and Rates:

All applications must be made within the cotyledon to 6 leaf stage of glyphosate tolerant canola. Temporary yellowing may occur if applied at the 4 to 6 leaf stage of the crop.

Not all glyphosate products are registered for use on glyphosate tolerant canola at all rates listed. Refer to individual product labels for specific uses and rates.

FORMULATION	RATES (L/ACRE)	WEEDS CONTROLLED
Single applications of:		
356-360 g/L	0.33 L/acre	*Weeds controlled at all stages unless indicated otherwise:* **Annual grasses:** barnyard grass, green foxtail, volunteer cereals, wild oat. **Annual broadleaves:** annual smartweed spp.**, chickweed, corn spurry, cow cockle*, hemp-nettle, kochia, lamb's-quarters, night-flowering catchfly*, redroot pigweed, Russian thistle, shepherd's-purse*, stinkweed, volunteer canola (except glyphosate tolerant varieties), wild mustard, wild tomato.
450 g/L	0.27 L/acre	
480 g/L	0.24 L/acre	
500 g/L	0.24 L/acre	
540 g/L	0.22 L/acre	
356-360 g/L	0.50 L/acre	*All stages of the weeds listed above plus:* **Annual broadleaves:** cleavers, flixweed, wild buckwheat, stork's-bill , narrow-leaved hawk's-beard. **Perennial weeds suppressed:** Canada thistle, dandelion, perennial sow-thistle, and season long quack grass control.
450 g/L	0.40 L/acre	
480 g/L	0.38 L/acre	
500 g/L	0.36 L/acre	
540 g/L	0.34 L/acre	
Double application (first application as above)		
356-360 g/L	0.50 L/acre	*Additional flushes of the weeds Listed above plus:* **Annual broadleaves:** round-leaved mallow **Season long control of following perennials:** Canada thistle, foxtail barley, and perennial sow-thistle.
450 g/L	0.40 L/acre	
480 g/L	0.38 L/acre	
500 g/L	0.36 L/acre	
540 g/L	0.34 L/acre	
Single application at the rates below:		
356-360 g/L	0.75 L/acre	*All weeds in single applications above plus:* **Season long control of following perennials:** Canada thistle and perennial sow-thistle.
450 g/L	0.61 L/acre	
480 g/L	0.56 L/acre	
500 g/L	0.55 L/acre	
540 g/L	0.51 L/acre	

* Low rates can be used only up to the 3 leaf stage of the crop otherwise use the high rate.

** Low rates can be used only when annual smartweed is in the 4 to 6 leaf stage.

NOTE: A maximum of 1.0 L/acre (356 to 360 g/L formulations), 0.81 L/acre (450 g/L formulations), 0.76 L/acre (480 g/L formulations), 0.73 L/acre (500 g/L formulations) and 0.67 L/acre (540 g/L formulations) per season is allowed in glyphosate tolerant Canola

Glyphosate tolerant corn and soybean:

Weeds, Staging and Rates:

All applications must be made within the following crop growth stages.
Corn - up to and including 8 leaf stage
Soybean - first trifoliate leaf through flowering.

Not all glyphosate products are registered for use on glyphosate tolerant corn and soybeans at all rates listed. Refer to individual product labels for specific uses and rates.

	FORMULATION	RATE (L/ACRE)	WEEDS CONTROLLED
Single application	356-360 g/L	1.0 L/acre	**Grasses:** barnyard grass crabgrass spp. foxtail (green, yellow, giant) proso millet quack grass volunteer barley and wheat wild oats **Broadleaves:** biennial wormwood* Canada thistle chickweed cleavers corn spurry cocklebur cow cockle common milkweed (suppression only) common ragweed eastern-black flowering night-shade flixweed hemp-nettle kochia lamb's-quarters narrow-leaved hawk's-beard perennial sow-thistle night-flowering catchfly pigweed (smooth, redroot) round-leaved mallow Russian thistle shepherd's-purse smartweed spp. stinkweed (suppression only) stork's-bill velvetleaf volunteer canola (except glyphosate tolerant varieties) wild mustard wild buckwheat wild tomato
	450 g/L	0.81 L/acre	
	480 g/L	0.76 L/acre	
	500 g/L	0.73 L/acre	
	540 g/L	0.67 L/acre	
Second applications	356-360 g/L	1.0 L/acre	**Late flushes of heavy infestations of the above weeds plus control of:** common milkweed, field bindweed, round-leaved mallow, yellow nutsedge
	450 g/L	0.81 L/acre	
	480 g/L	0.76 L/acre	
	500 g/L	0.73 L/acre	
	540 g/L	0.67 L/acre	

* Registered for control in glyphosate tolerant soybean only with *Roundup* products and R/T 540 only.

Additional Weeds, Staging and Rates in glyphosate tolerant soybean (first trifoliate to flowering) and corn (up to and including 6 leaf stage)**:

PRODUCT	FORMULATIONS	RATE (L/ACRE)	WEEDS CONTROLLED
Single application**	356-360 g/L	2.0 L/acre	**Heavy infestations of the annual weeds listed above plus control of:** Field bindweed, common milkweed, perennial sow-thistle, Canada thistle, and yellow nutsedge.
	450 g/L	1.62 L/acre	
	480 g/L	1.51 L/acre	
	500 g/L	1.46 L/acre	
	540 g/L	1.35 L/acre	

** The single application rate in glyphosate tolerant corn and soybean is not labeled for all glyphosate products. Refer to individual glyphosate labels for the registration status of this rate usage in glyphosate tolerant soybean and corn.

Tank mixes in glyphosate tolerant crops:

Tank mixes or rates listed may not occur on all product labels. Refer to individual product labels for registered tank-mixes.

Canola: *Lontrel* at 112 mL/acre.
Soybean: *Assure II* at 101 to 154 mL/acre, *Pursuit* at 65 to 85 mL/acre
Corn: *Atrazine* at 0.63 to 0.84 L/acre of 480 to 500 g/L formulations, *2,4-D* single application (500 g ai/L formulation) (0.22 to 0.45 L/acre)*, *2,4-D* split application (500 g ai/L formulation) (0.22 L/acre followed by 0.17 to 0.22 L/acre)*, *DyVel DSp* (0.44 L/acre)

* 2,4-D applications to corn may result in serious injury to some corn hybrids. Consult corn seed provider for varietal tolerance to 2,4-D applications. Apply prior to 4 leaf stage of corn.

10. Tank Mixes:

Not all glyphosate products are registered for all tank mix options below. Refer to individual glyphosate labels for registered tank mixes, glyphosate rates and registered crop species.

	RATE PER ACRE
Preseeding cereals***:	*2,4-D*◊ (0.23 to 0.58L)*
	Banvel II (0.12 L)*
	Bromoxynil - *Pardner* (0.51 L), *Koril* (0.48), *Brotex* (0.6 L)
	MCPA (0.2 to 0.4 L)*
	*Bromoxynil/MCPA** - *Buctril* M (0.2 to 0.4 L), *Logic M* (0.25 to 0.5 L)
Preseeding corn (field and sweet) & flax:	*MCPA*◊◊ (0.2 to 0.4 L)*
	*Bromoxynil/MCPA** - *Buctril M* (0.2 to 0.4 L), *Logic M* (0.25 to 0.5 L)
Preseeding corn (field only)	*Banvel II* (0.12 L)*
Preseeding field pea, lentil† & chickpea†:	*MCPA* Amine◊◊ (0.2 to 0.28 L)*
Preseeding canaryseed & seedling forage grasses◊◊◊:	*Bromoxynil/MCPA** - *Buctril M* (0.2 to 0.4 L), *Logic M* (0.25 to 0.5 L)
Chem fallow:	*2,4-D*◊ (0.5 L)*
	Dicamba (0.12 L)*
	Bromoxynil - *Pardner* (0.51 L), *Koril* (0.48), *Brotex*(0.6)
Canada thistle control in stubble or fallow:	*Dicamba* (0.51 L)**
Alfalfa control in spring / fall:	*2,4-D* (0.50 to 1.0 L)*

* Volunteer glyphosate tolerant canola control: Tank mixes of *2,4-D* at 0.23 to 0.34 L per acre, *MCPA* and *Bromoxynil/MCPA* will control volunteer glyphosate tolerant canola up to the 4 leaf stage and *2,4-D* at 0.45 to 0.68 L per acre will give control up to the 6 leaf stage. Earlier application will result in more consistent control. *Dicamba* or *Banvel II* at 0.12 L per acre will not control glyphosate tolerant canola.

** See re-cropping restrictions for *Dicamba* with fall applications.

*** 2,4-D tank-mixes in cereals are registered for winter wheat, wheat, barley, and rye; Bromoxynil tank-mixes in cereals are registered on wheat, oats and barley; bromoxynil/MCPA and MCPA tank-mixes registered on cereals include wheat, barley oat and rye; *Banvel II* tank-mixes in wheat, barley, rye oats.

Footnotes continued on next page.

† Under drought conditions, deep seeding and/or brief rain showers after seeding may cause injury to emerging seedlings in sprayer overlaps. NOT for use with *Cheminova Glyphosate, Credit 45, Glyphos, Knockout Extra, Lajj Plus, MPower Glyphosate, NuGlo, Polaris, SharpShooter, SharpShooter Plus*, or *Wise Up*.

◊ Rates based on 500 g/L formulations. All formulations are registered for tank mixes.

◊◊ Use only amine formulations of *MCPA* prior to corn lentil, chickpea and field peas.

◊◊◊ Forage grasses include brome grass, crested wheatgrass, intermediate wheat grass, slender wheatgrass, tall wheatgrass, Russian wildrye, timothy, orchard grass, creeping red fescue, meadow fescue, meadow foxtail, tall fescue, meadow bromegrass, streambank wheatgrass and reed canarygrass.

Note: The above mixes are those listed on the glyphosate labels only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. See the general guidelines for mixing pesticides for more information.

Application Information:

Water Volume:

Ground: Use 20 to 40 L per acre in most situations; use of the lower volume may improve control when hard water (Ca or Mg) or iron (Fe) ions are present (See Effects of Growing Conditions below). For certain crop situations, perennial weeds and tank mixes may require up to 120 L per acre of clean low ion water.

Aerial: Use 8.1 to 20 L per acre for registered preharvest uses only (see Aerial Application below). Minimum 20 L per acre for preseed, fallow, glyphosate tolerant crops and post-harvest treatments with *Roundup WeatherMax* only.

Refer to specific weed control situations or labels for more information on water volumes and adjuvants.

Nozzles and Pressure: Use 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver thorough, even coverage with ***ASABE medium*** droplets for ground applications and ***ASABE coarse*** droplets for aerial applications.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Best results are achieved when temperatures are near 20°C and when weeds are actively growing. Frost which kills more than 40% of the above ground tissue will reduce control. Control will also be reduced if foliage is heavily covered with dust. "Hard water" or water containing Calcium (Ca), magnesium (Mg) or iron (Fe) ions will reduce the activity of glyphosate products proportional to the level hardness. Reducing application water volume and /or adding ammonium sulphate at 1.2 kg/acre (99% dry) or 2.4 L/acre (49% solution) will reduce the negative effects of low levels of hard water ions. If water is extremely hard (greater than 700 ppm or 40 grains), another water source should be found. Dirty water or water with suspended soil or organic matter will reduce control.

Restrictions:

Rainfall: DO NOT apply if rainfall is forecast for the time of application, as weed control may be reduced. Consult manufacturer for more information.

Grazing Interval: All portions of forage and crops treated with glyphosate products may be fed to livestock.

Re-cropping Interval: No restrictions.

Aerial application: DO NOT apply *Cheminova Glyphosate, Credit 45, Crush'R Plus, Knockout Extra, Lajj Plus, Maverick III, Matrix, NuGLo, Polaris, Sharpshooter*, or *WiseUp* brands of glyphosate to cropland by air. All other glyphosate products listed in the "Product names, Company, Formulation and Packaging" chart are registered for aerial application for certain pre-harvest treatments. Not all crop species listed in the pre-harvest section are registered for aerial glyphosate application. Consult manufacturer for current aerial pre-harvest registration status.

ONLY *Roundup WeatherMax* may be applied by air when fields are too wet to access by ground sprayer (flooded) for preseed burndown, fallow treatment, or application to glyphosate tolerant crops (canola, corn, soybean and sugarbeet).

Storage: May be stored below 0° C.

Equipment: DO NOT mix, store or apply this product in galvanized steel or unlined steel (except stainless steel) containers or spray tanks.

Buffer Zones:

Application method	Uses	Buffer Zones (metres††) Required for the Protection of:	
		Aquatic habitats	Terrestrial habitat
Ground *	All uses	15	15
Aerial	Preharvest only**	25	55
	Preharvest only***	100	100
	Glyphosate tolerant canola only†	5	40
	Preseed, fallow, glyphosate tolerant crops (corn, soybeans, sugar beets)†	30	70

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

** *ClearOut 41 Plus, Factor 540, Glyphogan, Roundup Transorb HC, Roundup Ultra 2, Roundup WeatherMax, R/T 540, StartUp, Touchdown Total, Traxion* only.

*** *Glyfos, MPower Glyphosate, SharpShooter Plus, Vantage Plus Max II* only.

† *Roundup WeatherMax* only when conditions are too wet for access by ground sprayer.

†† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Glyphosate is very toxic to non-target plants.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Factor 540, Roundup Transorb HC, Roundup Ultra 2, Roundup WeatherMax, R/T 540:

☠ Caution – Poison

ClearOut 41 Plus, Cheminova Glyphosate, Glyphos, Factor 540, KnockOut Extra, Roundup TransorbHC, Roundup Ultra 2, Roundup WeatherMax, R/T 540, Sharpshooter Plus:

◇ Warning – Eye and Skin Irritant

All other products:

▽ Caution – Skin and Eye Irritant. Potential Skin Sensitizer

For an explanation of the symbols used here see page 11.

Glyphosate/dicamba

Herbicide Group
4 - dicamba
9 - glyphosate
(Refer to page 38)

Company:

Monsanto Canada (*Rustler*)
Syngenta Canada (*Takkle*)

Formulation:

***Rustler* (PCP#27200):** 194 ae/L glyphosate and 46 g/L dicamba present as isopropylamine (IPA) salts formulated as a solution.
Container sizes - 10 L, 115 L, 450 L, 750 L.

***Takkle* (PCP#29552):** 140 ae/L glyphosate and 70 g/L dicamba present as isopropylamine (IPA) salts formulated as a solution.
Container sizes - 160 L, 450 L.

Crops and Staging:

Summerfallow.

Pre-seeding on fields to be sown to wheat, barley, oats and rye.

May also be applied prior to sowing field corn in fields with more than 2.5% organic matter (DO NOT use on sandy or sandy loam soils).

Glyphosate/dicamba **SHOULD NOT** be applied prior to broadleaf crops such as lentils, peas, canola and flax due to the risk of injury.

Weeds, Rates and Staging:

Application should be made to emerged, actively growing weeds. Application at early growth stages generally provides the best results.

Annual grasses - Apply 1 L per acre between emergence and heading.

Downy brome
Green foxtail
Persian darnel
Volunteer cereals
Wild oats

Annual broadleaves - Apply 1 L per acre up to 6 inches (15 cm) height unless otherwise indicated.

Cow cockle
Flixweed
Kochia
Lamb's-quarters
Redroot pigweed
Russian thistle
Smartweed (including lady's-thumb)
Stinkweed
Volunteer canola*
Wild buckwheat (1 to 4 leaf)
Wild mustard

* NOT including glyphosate tolerant varieties.

Foxtail barley suppression - Apply 1.26 L per acre before initiation of the seedhead or bottom leaves beginning to brown off.

Application Information:

Water Volume: 20 to 40 L per acre water. Avoid the use of extremely hard water (greater than 700 ppm calcium and/or magnesium or high levels of iron). Use of the lower water volume may improve control in situations where hard water is the only source available.

Nozzles and Pressure: Use 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE medium to coarse*** droplets.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Reduced effectiveness may result if application is made to weeds that are drought-stressed, damaged by disease or insects. Poor control under cool, cloudy weather can occur. Dust on foliage can also cause reduction in control.

Tank Mixes:

Herbicides:

In wheat, winter wheat, barley and rye only:

2,4-D *Ester* or *Amine* (0.2 to 0.3 L/acre)†* or (0.4 to 0.5 L/acre)†**

- * to control volunteer glyphosate tolerant canola up to 4 leaf stage
- ** to control volunteer glyphosate tolerant canola up to 6 leaf stage.
- † Rates listed based on 2,4-D 600 formulations. Multiply rates by 1.2 for 500 formulations and 0.85 for 700 formulations.

Restrictions:

Rainfall: Within 6 hours may reduce weed control. Heavy rainfall within 2 hours of application may require a repeat treatment.

Re-entry: DO NOT enter treated fields for 12 hours.

Grazing: DO NOT allow lactating dairy animals to graze within 7 days of treatment or cut for feed or hay within 30 days. Remove meat animals from treated areas at least 3 days prior to slaughter.

Re-cropping: No restrictions in the season following treatment. DO NOT apply in fall or spring prior to broadleaf crops such as lentils, peas, canola and flax due to the risk of injury.

Aerial Application: DO NOT apply by air.

Storage: Store above 5°C.

Equipment: DO NOT mix, store or apply this product or spray solutions of this product in galvanized steel or unlined steel (except stainless steel) containers or spray tanks.

Buffer Zones:

Product	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Rustler (medium droplets)	1	1	15
Rustler (coarse droplets)	1	1	5
Takkle	15	15	15

See the key to product pages on page 27 for an explanation of the different habitats.

- * Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.
- † Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Rustler:

Caution – Poison

Danger – Corrosive to eyes.

Warning – Skin Irritant

Potential Skin Sensitizer

Takkle:

Warning – Eye Irritant

For an explanation of the symbols used here see page 11.

Gramoxone

Herbicide Group
22 - paraquat
(Refer to page 38)

Company:

Syngenta Canada (PCP#8661)

Formulation:

200 g/L paraquat formulated as a solution.
Container size - 4 x 5 L

Crops and Staging:

Stale seedbed: Non-selective weed control applied 3 days prior to crop emergence in beans, corn, potatoes, peas, soybeans.

Non-selective inter-row weed control: Apply as a directed spray between rows in row crops. Avoid contact with crop foliage.

Control of weed seedlings in established alfalfa and bird's-foot trefoil for hay: Apply 5 days after first cut.

Control of weed seedlings in bird's-foot trefoil for seed: Apply in spring when bird's-foot trefoil shoots are 3 to 6 inches (7.5 to 15 cm) long.

Non-selective weed control – shelterbelts: Apply as a directed spray in and around shelterbelt trees or woodlot plantings. Avoid contact with foliage.

Pre or Post seeding burndown: Apply prior to crop emergence in barley, canary seed, canola, corn (field, sweet and pop), dry beans, field peas, flax (including low linolenic types), lentils, mustard, oats, potato, rye, soybean, sunflower, triticale, wheat.

Weeds and Staging:

Annual weed burn-off. Best control when weeds are less than 2 inches (5 cm) in height or diameter.

Rates:

Pre or post seeding burndown: 0.8 to 1.6 L per acre

All other applications: If weeds are less than 2 inches (5 cm) in height, apply 1.1 L per acre (5 L treats 4.5 acres). If weeds are taller than 2 inches (5 cm), increase the rate of *Gramoxone* to 2.2 L per acre (5 L treats 2.2 acres).

Application Information:

Water Volumes:

Pre or post seeding burndown: Minimum 40 liters per acre. ***All other applications:*** 135 to 500 L per acre. Use the higher water volumes within the range if weed growth is dense. Good coverage is critical for good control.

Nozzles and Pressure: 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE medium*** droplets.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Best results on cloudy days or just prior to darkness.

Tank Mixes:

Corn: *AAtrex, Dual II Magnum, Frontier Max* and *Primextra II Magnum**
Soybean: *Dual II Magnum, Frontier Max, Linuron, Sencor**
* Refer to product labels for time of application and restrictions.

Restrictions:

Rainfall: Within 1 hour will reduce weed control.

Re-entry Period: DO NOT re-enter treated fields for 24 hours following application. If necessary, workers may re-enter field after 4 hours if wearing protective clothing. See label for details.

Grazing: DO NOT graze or harvest treated foliage. Regrowth from treated alfalfa or bird's-foot trefoil may be fed to livestock.

Re-cropping Interval: No restrictions

Aerial Application: DO NOT apply by air.

Storage: DO NOT freeze.

Buffer Zones:

Crop	Buffer Zones (metres†) Required for the Protection of:			
	Aquatic Habitats of Depths			Terrestrial habitat
	Less than 1 m	1 m to 3 m	Greater than 1 m	
Conservation tillage soybean	40	30	20	15
All other crops	50	40	30	20

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

DO NOT spray when conditions are dead clam or when wind is gusty or blowing faster than 16 km/hr.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Danger - Poison (may be fatal if swallowed)

Danger - Corrosive to eyes

For an explanation of the symbols used here see page 11.

Grazon

Herbicide Group
4 - picloram & 2,4-D
(Refer to page 38)

Company:

Dow AgroSciences (PCP#27634)

Formulation:

65 g/L picloram and 240 g/L 2,4-D formulated as a solution. Container size - 2 x 10 L and 110 L (through select outlets).

Note: Available only through selected retail outlets.

Crops and Staging:

Permanent grass pasture and rangeland. Apply in spring or early summer.

Weeds, Rates and Staging:

Broadleaf weeds:

Apply at 1.5 L per acre: for season long control ONLY

Canada thistle
Common yarrow
Dandelion

Apply at 2.8 L per acre: for control of the above weeds and the following weeds

Burdock
Clovers (red, sweet)
Common ragweed
Dock
Fleabane
Goldenrod
Plantain
Prickly lettuce
Vetch
Wild carrot

Application Information:

Water volume:
Ground application: 40 to 80 L per acre.
Aerial application: Minimum 8.1 L per acre.

Nozzles and Pressure: Use nozzles that will deliver coarse droplets in a uniform pattern. Maximum 30 psi (207kPa) by ground or air when using conventional flat fan nozzles.

Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver thorough, even coverage with *ASABE coarse* droplets.

Drift of even small amounts of *Grazon* into sensitive plants or areas where sensitive crops may be grown can cause injury. DO NOT apply under conditions prone to drift (i.e. high winds, dead calm and temperature inversions).

How it Works:

Refer to Table 2 on page 36.

IMPORTANT: Picloram is a very persistent and water-soluble herbicide. Treated soil should not be moved from the treated area. DO NOT apply to soils that are permeable, have sinkholes, or lie over limestone bedrock. DO NOT apply to soils whose surfaces are composed of fractured rock or unconsolidated gravel. Application to these sites may allow the movement of herbicide to underlying water sources or aquifers. When applying *Grazon* over sandy soils ensure that aquifers are not within 1.8 m of the soil surface. If shallow aquifers are present, DO NOT apply *Grazon*. *Grazon* must not be applied on range and pasture acres that are irrigated. DO NOT compost or mulch clippings or manure from grass treated with *Grazon* unless being reapplied to the treated area.

Effects of Growing Conditions:

Nothing listed on the *Grazon* label. Avoid application when pasture and target weeds are under stress from drought, flooding, extreme heat or cold, as injury to grass or unacceptable control may result. Avoid application when temperatures exceed 28°C.

Tank Mixes:

None registered.

Restrictions:

Rainfall: DO NOT apply if rainfall is forecast. No specific time frame is indicated on the label. Contact manufacturer for more information.

Re-entry: DO NOT re-enter pastures within 3 days of application.

Grazing: DO NOT allow lactating dairy animals to graze treated areas within 7 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter. DO NOT harvest forage or cut hay within 30 days of application. Feed livestock untreated forage for 7 days prior to moving onto land that produce broadleaf crops - otherwise urine or manure may contain picloram. **See restrictions in "How it Works" section above.**

Re-cropping: Legumes may not be established in a pasture for several years after treatment. If legumes are essential in a pasture, DO NOT use *Grazon*. DO NOT break up treated pasture and plant to sensitive broadleaf crops for at least 5 years after application of *Grazon*.

Aerial Application: May be applied by air.

Storage: Store product in original containers in a secure, dry, cool area. DO NOT freeze.

Buffer Zones:

See the key to product pages on page 27 for an explanation of the different habitats.

Field Sprayer (Rangeland Uses):

Use Rate (L/acre)	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
1.5	1	1	30
2.8	2	1	55

* These distances can be reduced by 30% using cones on individual nozzles and by 70% using a full shield (shroud, curtain) that extends to the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Refer to the label for buffer zone requirements for aerial application.

Heavy rains can move this product from its application site down slope toward sensitive areas. DO NOT load or mix near wells, dugouts or other water bodies.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Caution – Poison

⚠ May cause skin and eye irritation

For an explanation of the symbols used here see page 11.

Harmony K

***Harmony K* is equivalent to a tank mix of *thifensulfuron/tribenuron* (page 270), *clodinafop* (page 122) plus *dicamba* (page 126). For other detailed information on the component products see the product pages listed above.**

Herbicide Group

1 - clodinafop
2 - thifensulfuron & tribenuron
4 - dicamba
(Refer to page 38)

Company:

E. I. duPont Canada

Formulation:

The *Harmony K* package contains the following components:

***Harmony Broadleaf* (PCP# 30027):** 53.8% dicamba sodium salt, 7.7% thifensulfuron methyl, and 3.9% tribenuron methyl formulated as a water dispersable granule.

Container size - 2.104 kg

***Harmony Grass* (PCP#29202):** 128 g/ L clodinafop-propargyl formulated as an emulsifiable concentrate with built in adjuvant.

Container size - 1 x 7.1 L

Crops and Staging:

Spring wheat (including durum) from the 2 to 5 leaf stage.

Weeds and Staging:

Harmony K controls the same weeds as *Harmony SG* with the addition of Group 2 resistant kochia and dandelion (spring or fall rosettes less than 15 cm in diameter).

NOTE: Surveys of fields with kochia have found that roughly 90% of these kochia populations were resistant to Group 2 herbicides. Without testing that confirms otherwise, assume that kochia in your field is likely resistant as well.

Rates:

Harmony Grass: 177 mL per acre

-plus either-

Refine SG: 12 g per acre
Banvel II: 58.7 mL per acre

-or-

Harmony Broadleaf: 52 g per acre

One package treats 40 acres (16 ha)

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

See *thifensulfuron/tribenuron, clodinafop* and *dicamba*, pages on restrictions application details and handling. Use the most limiting restrictions across all components for the mix.

Harmony Max

Herbicide Group
1 - clodinafop
2 - thifensulfuron & tribenuron
4 - fluroxypyr
(Refer to page 38)

***Harmony Max* is equivalent to *thifensulfuron/tribenuron* (page 270) tank mixed with *clodinafop* (page 122) and *Perimeter* (= Starane or 'A' component of *Attain, Prestige* and *Trophy*). For other detailed information on the component products see the product pages listed above.**

Company:

E. I. duPont Canada

Formulation:

The *Harmony Max* package contains the following components:

***Refine SG* (PCP#28285):** 33.35% thifensulfuron methyl plus 16.65% tribenuron methyl formulated as a water soluble granule.
Container size - 486 g bottle.

***Harmony Grass* (PCP#29202):** 128 g/ L clodinafop-propargyl formulated as an emulsifiable concentrate with built in adjuvant.
Container size - 1 x 7.09 L

***Perimeter* (PCP#29586):** 180 g/ L fluroxypyr formulated as an emulsifiable concentrate.
Container size - 4.86 L.

Crops and Staging:

Spring wheat (including durum) from the 2 leaf stage up to the emergence of the 4th tiller.

Weeds and Staging:

Broadleaf weeds controlled by *Refine SG* plus;
Group 2 resistant kochia.
Cleavers (up to 4 whorls)
Wild oat - 1 to 6 leaves up to the emergence of the 4th tiller.
Green foxtail - 1 to 5 leaves up to the emergence of the 3rd tiller.

For optimum control apply before the annual grasses tiller.

NOTE: Surveys of fields with kochia have found that roughly 90% of these kochia populations were resistant to Group 2 herbicides. Without testing that confirms otherwise, assume that kochia in your field is likely resistant as well.

Rates:

Refine SG: 12 g per acre

Harmony Grass: 177 mL per acre

Perimeter: 0.12 L per acre

One package treats 40 acres (16 ha) Refer to the product label for complete mixing instructions.

A general guide to mixing can be found on page 14.

Restrictions:

Rainfall: Within 1 hour of application may reduce control.

Re-Entry: DO NOT re-enter treated fields for 12 hours.

Preharvest Interval: Leave 60 days between application and harvest.

Grazing: MUST NOT be grazed or fed to livestock for 7 days after treatment.

Re-cropping: Barley, canola, flax, forage grasses, lentils, mustard, oats, peas, rye or wheat or fields can be summer-fallowed the year after treatment.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool, dry place. May be frozen. If frozen, bring to room temperature and agitate before use. This product is COMBUSTIBLE. DO NOT store near heat or open flame.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground*	15	15	15

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

See the key to product pages on page 27 for an explanation of the different habitats.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Danger - Poison

⚠ Warning – Eye and Skin Irritant; contains the allergen epoxidized soybean oil.

For an explanation of the symbols used here see page 11.

Harmony SG

This product is a prepackaged tank mix of *thifensulfuron/tribenuron* (page 270) and *clodinafop* (page 122). Information listed is restricted to Crop, Weeds, Rates and Tank mixes. For other detailed restrictions and other general information on the component products see the product pages listed above.

Herbicide Group

1 - clodinafop

2 - thifensulfuron & tribenuron

(Refer to page 38)

Company:

E. I. duPont Canada

Formulation:

The *Harmony SG* package contains the following components:

***Refine SG* (PCP#28285):** 33.35% thifensulfuron methyl + 16.65% tribenuron methyl; formulated as a water soluble granule.
Container size - 486 g bottle.

***Harmony Grass* (PCP#29202):** 128 g/ L clodinafop-propargyl formulated as an emulsifiable concentrate, with built in adjuvant.
Container size - 1 x 7.1 L

Crops and Staging:

Spring wheat (including durum) up to the emergence of the 4th tiller.

Weeds and Staging:

Broadleaf weeds controlled or suppressed by *Refine SG* plus:

Wild oat - 1 to 6 leaves up to the emergence of the 4th tiller.

Green foxtail - 1 to 5 leaves up to the emergence of the 3rd tiller.

For optimum control apply before the annual grasses tiller.

Rates:

Refine SG: 12 g per acre

Harmony Grass: 177 mL per acre

One case treats 40 acres (16 ha)

Refer to the product label for complete mixing instructions.

A general guide to mixing can be found on page 14.

Tank Mixes:

Herbicides:

MCPA Ester (0.34 to 0.45 L/acre of 500 g/L formulation).

Banvel II (44.5 or 59 mL/acre).

See component products for more information on restrictions application details and handling. Use the most limiting restrictions across all components for the mix.

Heat

Herbicide Group

14 - saflufenacil

(Refer to page 38)

Company:

BASF Canada (PCP# 29368)

Formulation:

70 % saflufenacil formulated as a water soluble granule.
Container size - 8 x 844 g containers per case.

Crops, Rates and Staging:

Prior to the seeding of; or following seeding and prior to the emergence of the following crops; fallow or after harvest:
Must be applied as part of a tank mix with glyphosate from 180 to 360 g ae per acre (0.5 to 1 L per acre of 360 g per L forms):

CROP	RATE (g of product per acre)
Barley, canaryseed, chickpea, corn (field and sweet*), field pea, oat, wheat (including spring, winter and durum)	10.4 to 28.4
Lentil† soybean†*	10.4
Summer-fallow and post-harvest	10.4 to 28.4

* Some varieties may be more sensitive to *Heat* and injury may occur

† DO NOT use rates higher than 10.4 g per acre or injury could result.

Add either *Merge* or *Amigo* adjuvant at 0.2 L per acre (One 844 g container treats 80 to 30 acres)

Harvest Aid/ Desiccation:
Apply 14.4 to 28.4 grams per acre plus Merge at 0.2 L per acre to speed the rate of dry-down of the following crops and green weedy material. The required delay before harvest of each crop is indicated below.

CROP	PRE-HARVEST INTERVAL	APPLICATION STAGE
Field Peas	3	A majority of the pods are brown (70 – 80%)
Lentils	3	Lower most pods (15%) are brown and rattle when shaken
Dry bean,	2	Stems are green to brown, pods are mature (yellow to brown), and 80 – 90% of leaves have dropped
Soybean	3	
Sunflower	7	The backs of flower heads and bracts are turning yellow, and seed moisture is 20 – 30%.

Heat may be tank mixed with glyphosate on field pea, lentil, dry beans and soybeans for additional pre-harvest weed control. DO NOT tank mix with glyphosate when the harvested grain is to be used for seed.

Note: Tolerances for Heat residue may not be established in all countries importing the above crops. Check with your grain buyer prior to application to determine if they will accept these crops treated with Heat.

Weeds, Rates and Staging:

Apply up to the 8 leaf stage unless otherwise indicated to control the weeds controlled by glyphosate plus rapid burndown of:

Canada fleabane
Cleavers (4 whorl-stage)
Dandelion
Kochia (up to 15 cm)
Lamb's-quarters
Flixweed
Narrow-leaved hawk's-beard
Pigweed (redroot)**
Round-leaved mallow
Stinkweed**
Volunteer canola**
Wild buckwheat **
Wild mustard**

* All varieties

** Applications at the 28.4 g per acre rate will also provide suppression of the emergence of these weeds following application.

Application Information:

Water volume:

Preseed, summerfallow or post harvest by ground only:
20 to 40 L per acre.

Desiccation:
Ground: 81 L per acre
Aerial: 20 L per acre.

Higher volumes are required for dense weed stands. Weed control improves with the amount of coverage.

Nozzles and Pressure: Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* classification droplets. Low drift nozzles may require higher pressures for proper performance. Higher pressures may be required to penetrate dense weed stands.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Rainfall shortly after application can result in slight injury to the crop. See the 'Restrictions' section below for more details. Warm, moist growing conditions promote active weed growth. Weeds hardened off by environmental stress such as cold weather, drought or excessive heat may not be adequately controlled.

Tank Mixes:

Herbicides:

Preseed, summerfallow or post harvest:
Glyphosate (180 g to 360 g ae per acre)*
* must be mixed with glyphosate.

Desiccation/Harvest Aid:
Glyphosate (360 g ae per acre)†
† NOT for use on crops to be used for seed.

(see glyphosate page for product concentrations and equivalent application rates)

Fungicides: None registered

Insecticides: None registered

Fertilizers: None registered

Note: The above mixes are those listed on the *Heat* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Rainfall shortly after application can result in slight injury to the crop. Lentils are more sensitive to injury on coarse textured (sandy or gravely) and low organic matter soils. Injury will appear as slight leaf edge burning, which will be grown out of and yield will not be affected.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Preharvest: Leave 60 days between treatment and harvest.

Grazing: DO NOT graze fields or feed straw from fields where *Heat* is applied as a harvest aid treatment.

Re-cropping:

	APPLICATION RATE (per acre) AND TIMING		
	Spring Application		Pre-harvest Application
CROP	10.4 g	up to 28.4g	up to 28.4g
Barley	PB	PB	1
Canary seed	PB	PB	1
Canola	1	1	2
Chickpea	PB	PB	1
Corn	PB	PB	1
Dry Bean	1	1	2
Flax	1	1	2
Lentil	PB	1	2
Mustard	1	1	2
Oat	1	1	1
Field Pea	PB	PB	1
Soybean	PB	1	1
Spring Wheat (including durum)	PB	PB	1
Winter wheat	PB	PB	1

PB May be planted back in the same season
1 May only be planted the season following application
2 May only be planted the second season following application

Aerial Application: May be applied by aircraft for desiccation use only. DO NOT apply by air for any other use.

Storage: Store in dry, cool storage. May be frozen.

Buffer Zones:

Application method	Crop	Buffer Zones (metres†) Required for the Protection of Terrestrial Habitat
Ground only*	Lentil, Soybean	3
	All other crops	10
Fixed wing airplane	All desiccation uses	175
Helicopter	All desiccation uses	150

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as meters from the downwind edge of the spray boom to sensitive habitat.

DO NOT apply in areas where surface water from the treated area can run off to adjacent cropland, streams

Tank Cleaning:

HEAT can cause injury to sensitive crops at very low concentrations. Sprayers used to spray this product should be flushed out immediately after use.

1. Drain tank and flush tank, boom and hoses with clean water.
2. Visually inspect tank to ensure removal of all visible herbicide residues. If necessary, repeat Step 1.
3. Fill the tank with clean water, and then add a detergent tank cleaner at the recommended rate. Agitate for 15 minutes ensuring the cleaning solution comes in contact with interior surfaces. Flush the boom and hoses with the cleaning solution and drain the sprayer.
4. Remove nozzles and screens and clean separately with a detergent cleaning solution.
5. Rinse the tank with clean water and flush through the booms and hoses using at least on tenth of the spray tank volume. Drain tank completely.

Refer to page 15.

Hazard Rating:

⚠ Caution – Possible Skin Irritant

For an explanation of the symbols used here see page 11.

Imazamethabenz

Herbicide Group
2 - imazamethabenz
(Refer to page 38)

Company:

Nufarm Agriculture (*Assert 300SC* - PCP# 21032)
Viterra (*Avert* – PCP#29618)

Formulation:

300 g/L imazamethabenz formulated as a suspension concentrate.
Container size - 2 x 10.8 L jugs per case.

pH adjuster: 94.5% sodium bisulfate formulated as a soluble granule.
Container size - 2 x 2.5 kg bags (1 bag per 10.8 L jug of *imazamethabenz*).

Crops, Rates and Staging:

pH adjuster: 1 packet per jug of Assert to be used.

***Imazamethabenz* up to 0.67 L per acre (16.1 acres per jug):**
Barley, spring wheat (including durum) - 1 to 6 leaf stage.
Annual ryegrass (seed production only) - 4 to 6 leaf stage.

***Imazamethabenz* at 0.34 L per acre (32 acres per jug):**
Sunflower – plants (not under drought stress) that are in the 2 to 8 leaf stage. Crop must be less than 15 inches (38 cm) tall except for semi-dwarf varieties, which must be less than 12 inches (30 cm), and dwarf varieties, which must be less than 4 inches (10 cm). Stunting and head deformation can occur from applications made beyond recommended stages.

DO NOT apply *imazamethabenz* to the same field more than once in two years.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions. Refer to the product label for complete mixing instructions.
A general guide to mixing can be found on page 14.

Weeds, Rates and Staging:

WEEDS	STAGE	RATE	
		(L per acre)	Acres per 10.8 L jug
Stinkweed Wild mustard	Up to 6 leaves	0.34	32
Weeds above plus: Buckwheat (wild and tartary) (suppression) Volunteer canola (except Clearfield varieties)	Up to 4 leaves	0.54	20
Wild oats	1 to 3 leaves		
Wild oats	1 to 4 leaves	0.67	16

* Main stem leaves.

Application Information:

Good coverage of foliage is important to maintain good control

Water volume: In cereals only, *imazamethabenz* may be applied in 20 to 40 L of water per acre when applied alone or when tank mixed with *dichloroprop/2,4-D, 2,4-D ester*, or *MCPA ester*. For all other applications, apply in 40 L per acre.

Nozzles and Pressure: 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE medium*** droplets or larger.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

DO NOT apply *imazamethabenz* 24 hours before or after a frost. It works best at warm temperatures. Performs relatively consistently under dry conditions. If cold, wet soil conditions persist in the days after application, retillering of wild oats may occur. DO NOT apply to drought stressed sunflowers.

Tank Mixes:

Herbicides:

Imazamethabenz may be applied at either 0.53 L or 0.67 L per acre in tank mixes in the brown and dark brown soils, but must be applied at 0.67 L per acre when tank mixing in the black and grey wooded soils for adequate wild oat control.

In spring wheat (including durum) and barley:

*2,4-D Ester** (up to 0.32 L/acre) (700 g/L formulations)
Curtail M (0.80 L/acre)
Dichlorprop/2,4-D ester (0.7 L/acre)*†
*Fenoxaprop*** (0.118 L/acre)
*Fenoxaprop*** (0.118 L/acre) + *MCPA Ester,* (0.28 L/acre)
*Fenoxaprop*** (0.118 L/acre) + *Refine SG* (12 g/acre)
Frontline XL (0.65 L/acre)
Infinity (0.33 L/acre)
*MCPA Ester** (up to 0.38 L/acre) (600 g/L formulations)
Refine SG (12 g/acre)
Refine SG (12 g/acre) + *MCPA Ester,* (0.28 L/acre)
Spectrum (20 acres per case)
Trophy (20 acres per case)

† Mix with *Turboprop* is NOT for use in barley. *Dichlorprop-D* registered with *Assert* only.

* Apply in 20 to 40 L of water per acre. For all other tank mixes use 40 L/acre.

** Use the 0.54 L/acre rate of *imazamethabenz* when tank mixing with *fenoxaprop* (see product labels for specific products). *Fenoxaprop* rate provides green foxtail control only.

*** When tank mixing dry broadleaf products, add products to the tank in the following order: dry broadleaf products, acidifier, *imazamethabenz*, and other liquid herbicides if required. For repeat tanks, dry broadleaf products need to be mixed with water to form a slurry prior to adding to the remaining spray solution in the tank.

Refer to *imazamethabenz* labels for specific mixing order and application details when tank-mixing.

Refer to tank mix partner for additional crop staging restrictions.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *imazamethabenz* labels only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 6 hours will reduce control.

Re-entry: Wait at least 12 hours before entering treated fields.

Grazing: DO NOT graze treated fields or cut treated forage for silage or hay. Mature barley and wheat grain or straw from fields treated with *imazamethabenz* can be fed to livestock. DO NOT feed or graze treated annual ryegrass.

Preharvest Interval: DO NOT apply beyond the recommended crop stage.

Re-cropping:

DO NOT apply imazamethabenz *to the same field more than once in two years.*

Year After Application	Black and Grey Wooded Soils	Brown and Dark Brown Soils
Year 1	Spring wheat (including durum), barley, canola, field peas, flax, sunflowers	Spring wheat (including durum), CLEARFIELD canola, barley, sunflowers
Year 2	Spring wheat (including durum), barley, canaryseed, canola, field peas, flax, oats, sunflowers	

Conduct a field bioassay (a test strip grown to maturity) the year before growing any crop not listed in the table. Lentils are known to be particularly sensitive to *imazamethabenz* residues in the soil. The additive effect of soil residues from the use of *imazamethabenz* and sequential applications of *imazethapyr, metsulfuron,* or *Odyssey* herbicides on the same land area has not been determined. Crop rotation guidelines are not known and injury to rotational crops other than wheat (excluding durum) may occur. Plant only wheat (excluding durum) on fields where these herbicides have been used until a field bioassay demonstrates other crops can be grown successfully.

Aerial Application: DO NOT apply by air.

Storage: DO NOT freeze. Shake well before using.

Buffer Zones:

CROP	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Sunflower	0	0	1
Annual ryegrass, Cereals	1	0	1

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Handheld or backpack sprayers do not require a buffe zone.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Caution – Poison

Warning – Eye Irritant

For an explanation of the symbols used here see page 11.

Imazethapyr

Herbicide Group
2 - imazethapyr
(Refer to page 38)

Company:

BASF Canada (*Pursuit* - PCP#23844)
Farmers of North America (*MPower Kamikaze* - PCP#30127)
MANA Canada (*Phantom* – PCP#30017)
Univar (*Gladiator* - PCP#28923)
Viterra (*MultiStar* - PCP#29259)

Formulation:

240 g/L imazethapyr formulated as a liquid.
Container size - 2 x 3.3 L jugs per case.

Crops and Staging:

All products: DO NOT use in the brown or dark brown soil zones (except for use in dry beans and alfalfa under irrigated brown soils); rotational crops may be severely injured due to carry over in these soils.

CROP	STAGE
Field pea	May be applied up to the sixth above-ground node stage (6 true leaves).

***Pursuit, Gladiator, MultiStar* and *Phantom* only:**

CROP	STAGE
Dry bean (pinto, pink and red varieties only)	Up to and including the second trifoliate leaf stage
Soybean (Manitoba only)	Up to and including the third trifoliate leaf stage
Seedling alfalfa (forage or seed production)*	Apply after the first trifoliate leaf stage.
Established alfalfa (seed production only)**	Apply before alfalfa reaches 12 inches (30 cm) in height.
Chickling vetch grown for seed	Apply at the 5 to 7 leaf stage.

* Apply only to seedling alfalfa that will remain in production for at least 3 years following application. Apply only once during the life of the alfalfa stand.

** DO NOT apply in the last year of established alfalfa stands.

Weeds and Staging:

In field peas. Apply up to the 4 leaf stage, unless otherwise indicated:

Chickweed
Cleavers
Green foxtail
Hemp-nettle
Redroot pigweed
Shepherd's-purse
Smartweed
Stinkweed
Volunteer canola (not CLEARFIELD varieties)
Wild buckwheat†
Wild mustard
Wild oats † (2 to 4 leaf stage)

In seedling and established alfalfa:

Common groundsel*†
Green foxtail†
Green smartweed *
Redroot pigweed
Shepherd's-purse*†
Stinkweed
Volunteer canola (not CLEARFIELD varieties)
Wild mustard

In dry beans:

Hairy nightshade (up to 6 leaf stage)

* Seedling alfalfa only.

† Suppression

Rates:

85 mL per acre (40 acres per jug).

A non-ionic surfactant with at least 80% active ingredient (*Agral 90, Agsurf, Surf 92*) should be added at a rate of 0.25 L per 100 L of spray solution. DO NOT over apply *imazethapyr*, as crop injury may result.

DO NOT apply *imazethapyr* more than once per season or follow *imazethapyr* with any related product in the same year.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 40 to 160 L per acre.

Nozzles and Pressure: Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

DO NOT spray if temperatures of +5°C are forecast within 3 days of application. Treat crops during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced.

Tank Mixes:

None registered.

Note: There are no tank mixes listed on the *imazethapyr* labels. To check for other possible registered tank mixes see the blue fold out chart inside the back cover.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: DO NOT graze or harvest seedling alfalfa within 14 days of treatment. DO NOT graze or harvest field peas for feed within 30 days. DO NOT graze other treated crops or cut for feed prior to crop maturity.

Preharvest Interval: DO NOT apply within 60 days of harvesting field peas or chickling vetch, within 75 days of harvesting dry beans, or within 85 days of harvesting soybeans.

Re-cropping: Rotate to barley, spring wheat (not durum), lentils, alfalfa, field peas or CLEARFIELD canola the year following application. The manufacturer recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crop other than those listed above. However, yield losses within the test strips may not be noticed unless the yield can be compared to an untreated area seeded adjacent to the *imazethapyr*-treated strip. In case of crop failure, only field peas or CLEARFIELD canola may be replanted in the year of application.

NOTE: Breakdown of imazethapyr *may be slowed or delayed by environmental conditions such as drought, excessive cold and/or acid soils (pH less than 6.5) resulting in an increased risk of injury to rotational crops. The most tolerant crops are CLEARFIELD canola and legume crops, then cereals. Contact manufacturer for additional information on re-cropping intervals (1-877-3712273).*

Aerial application: DO NOT apply by air.

Storage: DO NOT freeze. If the product is exposed to temperatures below 0°C, thaw the product completely and shake the container vigorously prior to use.

Buffer Zones: DO NOT apply within 15 m of shelterbelts, water bodies, wetlands, and woodlots.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

⚠ Caution – May cause skin irritation

⚠ Caution – May cause eye damage

For an explanation of the symbols used here see page 11.

Infinity

Herbicide Group
6 - pyrasulfotole
27 - bromoxynil
(Refer to page 38)

Company:

Bayer CropScience - PCP#28738

Formulation:

37.5 g/L pyrasulfotole and 210 g/L bromoxynil formulated as an emulsifiable concentrate.

Container size - 2 x 6.7 L jugs per case.

Crops and Staging:

The following crops may be treated when at the 1 leaf stage of growth until the flag leaf is just visible but still rolled:

Barley
Perennial ryegrass * (seedling & established, grown for seed or forage)
Red fescue and bromegrass * (established, grown for seed or forage)
Timothy (seed production only)
Triticale
Wheat (spring, durum, winter)

* *NOTE: Since the uses on forage grasses were registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance.* ***Those who apply this use do so at their own risk.***

Weeds, Rates and Staging:

At 0.33 L per acre (one case treats 40 acres) the following weeds are controlled at the 1 to 6 leaf stage unless otherwise noted:

Annual sow-thistle
Chickweed
Canada Thistle* (up to 30 cm)
Cleavers (1 to 6 whorls)**
Common Ragweed
Dandelion* (up to 25 cm across†)
Flixweed (up to 10 cm)
Hemp-nettle
Kochia (up to 10 cm)
Lamb's-quarters
Pale smartweed
Perennial sow-thistle*
Redroot pigweed
Round-leaved mallow*
Russian thistle (up to 10 cm)
Shepherd's-purse
Stinkweed
Volunteer canola***
Wild buckwheat
Wild mustard

* Suppression only
** Add ammonium sulphate at 202 g/acre (99% dry) or 0.4 L/acre (49% solution) at 4 to 6 whorls. If using an ammonium sulphate product with a different concentration, adjust the rate accordingly.
*** All herbicide tolerant varieties.
† Spring seedlings and overwintered rosettes.

DO NOT apply *Infinity* more than once or follow *Infinity* with any related products in the same year.

Application Information:

Water Volume:

Ground: Minimum 19 L per acre
Aerial: Minimum 11.4 L per acre

Higher water volumes should be used under dense crop and weed canopies to ensure thorough coverage of the target weeds.

Nozzles and Pressure: Maximum 40 to 45 psi (275 to 310 kPa) with conventional flat fan nozzles. Use nozzles and pressure designed to deliver proper coverage with *ASABE medium* droplets. Angle ground sprayer nozzles forward at a 45° angle to improve coverage of vertical leaf targets.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

For best results, apply to emerged, young, actively growing weeds according to the weed stages listed. Under stressed conditions and/or heavy crop canopy, early application will result in improved weed control. Weeds growing under adverse environmental conditions such as drought will be less susceptible herbicide effects

Tank Mixes:

Herbicides:

Wheat (spring, winter, and durum), barley and triticale:
Liquid Achieve (0.2 L/acre) plus *Turbocharge* adjuvant

Wheat (spring and durum) and barley only:
Puma Advance (206 to 412 mL per acre)
Puma^{120} *Super* (0.16 to 0.31 L/acre)

Wheat (spring and durum) only:
Horizon 240 EC (93 mL/acre) plus *Score* adjuvant

Wheat (spring, NOT durum) and barley only:
Axial 100EC (0.28 L/acre) plus *Adigor* adjuvant

Fertilizers: DO NOT mix with fertilizers other than those indicated above.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *Infinity* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Bayer also supports the following mixes that are not on the *Infinity* label. Apply mixes according to the most restrictive use limitations for either product:
Herbicides: *2,4-D Ester* (56-112 g ai/ac), *Axial +Stratego, Axial+Tilt, Lontrel, MCPA Ester* (56-112 g ai/ac), *Puma Advance + Stratego, Puma Advance + Tilt, Traxos, Varro, Traxos+Tilt.*
Fungicides: *Stratego, Tilt.*
Insecticides: *Decis, Sevin XLR.*

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 1 hour of application may reduce control.

Re-entry: DO NOT re-enter treated area within 12 hours.

Grazing: DO NOT graze treated crops or cut for hay within 25 days of application.

Preharvest Interval: Leave at least 50 days for wheat and triticale and 45 days for barley from application to harvest of grain or straw.

Re-cropping: Alfalfa, barley, canaryseed, canola, field corn (Manitoba only), flax, potatoes, soybeans (Manitoba only), sunflowers, tame oat, and wheat (durum, spring) may be seeded the year following application. Field peas may be grown the season following application in black, grey-wooded and dark brown soil zones. *DO NOT plant field peas the season following Infinity use in the brown soil zone where organic matter content is below 2.5 % and where soil pH is above 7.5.* Lentils may be seeded the second season after application.

Aerial Application: May be applied by air.

Storage: Store product in original containers in a secure, dry area, away from other pesticides, food or feed above –20°C. If stored over winter, shake or mix well before using.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	1	5
Fixed wing airplane	10	1	375
Helicopter	10	1	225

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

The manufacturer recommends a cleanout process similar to "Method A" on page 15 using a combination of water and ammonia solution rinses.
For additional information, Refer to page 15.

Hazard Rating:

Warning – Warning Poison

Warning – Eye and Skin Irritant.

Warning – Contains the allergen soy.

For an explanation of the symbols used here see page 11.

Kerb 50-WSP

Herbicide Group
15 - propyzamide
(Refer to page 38)

Company:

Dow AgroSciences (PCP#25595)

Formulation:

50% propyzamide formulated as a wettable powder. Container size - 1.36 kg (3 x 454 g water soluble pouches).

Crops and Staging:

Apply to the following established crops between October 1 and freeze-up or very early spring*. Temperatures should be above freezing at time of application but should not exceed 12°C after application or a reduction in control may be observed. Applications are more effective if followed by a rain. Contact manufacture for specific staging and application guidelines prior to application.

Established alfalfa, bird's-foot trefoil, and established pastures**.

* Early spring application for seed alfalfa only.

** *Severe stand thinning* may occur to pastures consisting primarily of crested wheatgrass, meadow fescue and timothy. Some thinning (10 to 15%) may occur with tall fescue and creeping red fescue.

Weeds, Rates and Staging:

Apply in late fall or very early spring (seed alfalfa only) prior to the emergence of weeds.

Established grass or grass/legume pastures for control of foxtail barley:

Brown, dark brown or gray wooded soils - 0.36 kg per acre.

Black soils - 0.45 kg per acre.

Alfalfa and bird's foot trefoil:

WEED	RATE (kg/acre)
Annual grasses, volunteer cereals, wild oat	0.71
Quackgrass, orchardgrass, timothy, chickweed	0.91 to 1.32*
Dodder (fall application only)	1.3

Note that complete control may not be achieved.

* Maximum 0.91 kg per acre with spring application. Low temperatures and adequate moisture following application are needed for efficacy.

Caution: DO NOT use on soils with more than 6% organic matter. DO NOT apply to soils prone to flooding. DO NOT apply to pastures that contain high proportions of timothy, crested wheat grass or meadow fescue. Consult the manufacturer for other forage grass species sensitivities to *Kerb 50-WSP.*

Application Information:

Water Volume: 120 to 200 L per acre.

Nozzles and Pressures: Maximum 30 to 40 psi (200 to 275 kPa) with conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver thorough, even coverage with ***ASABE coarse*** droplets.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Dry soil conditions at time of weed emergence may result in reduced control. Approximately 3 inches of total precipitation is required for adequate activation. Best results when soil temperatures are low but above freezing.

Tank Mixes:

None Registered

Restrictions:

Rainfall: Surface applications are most effective if followed by 0.5 to 1 inch (1.25 to 2.5 cm) of rain within 2 days of application. Avoid application when heavy rain is forecast.

Re-entry: DO NOT re-enter treated areas for 24 hours.

Grazing: DO NOT graze or harvest for livestock feed within 90 days of the 1.32 kg/acre rate and 60 days of application for lower rates.

Re-cropping: DO NOT re-plant to crops within 1 year of treatment.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool, dry place. Do not freeze.

Buffer Zones: DO NOT contaminate domestic or natural water sources or wetlands.

Crop	Buffer zone* (meters†) for terrestrial habitat
Established grass pastures, established grass / legume pastures, alfalfa or trefoil grown for seed	5

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

▽ Caution – Poison

For an explanation of the symbols used here see page 11.

Liberty 150SN

Herbicide Group
10 - glufosinate
(Refer to page 38)

Company:

Bayer CropScience (PCP#28837)

Formulation:

150 g/L glufosinate ammonium formulated as a solution. Container sizes: 13.5 L, 108 L, 432 L.

Crops and Staging:

Liberty Link Canola - cotyledon to early bolting stage. Temporary crop discolouration (bronzing) may be observed after application.

Note: A valid Liberty and Trait Agreement is required to purchase Liberty 150SN.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds, Rates and Staging:

WEED	WEED STAGE (from emergence to stage)	RATE (L/ACRE)	ACRES PER 13.5 L
Cow cockle	4 leaf	0.54	25
Green foxtail	6 leaf (max. 3 tillers)		
Barnyard grass	4 leaf	0.81	16.6
Wild mustard	5 leaf		
Lamb's-quarters, smartweed (lady's-thumb)	6 leaf		
Stinkweed	8 leaf		
Volunteer flax	2.5 inches (6 cm)		
Russian thistle	3 inches (8 cm)		
Wild buckwheat	3 leaf	1.08	12.4
Redroot pigweed, round-leaved mallow, quackgrass*	4 leaf		
Light to moderate infestations† of volunteer wheat, volunteer barley*	4 leaf (max. 2 tillers)		
Hemp-nettle (1 to 3 leaf pairs), shepherd's-purse	6 leaf		
Common chickweed (max. 4 leaf pairs), sow-thistle	8 leaf		
Kochia	3 inches (8 cm)		
Canada thistle*, scentless chamomile	4 inches (10 cm)		
Cleavers	2 whorls (nodes)	1.35	10
Stork's-bill and heavy populations of wild buckwheat	3 leaf		
Quackgrass (light to moderate** or heavy infestations*)†, volunteer wheat, volunteer barley*, wild oat	4 leaf (max. 2 tillers except quackgrass)		
Hemp-nettle	8 leaf (1 to 4 leaf pairs)		
Dandelion rosettes	6 in. (15 cm) across		
Flixweed, Canada thistle*	4 inches (10 cm)		
Quackgrass***	4 leaf	1.6	8.3
Canada thistle**	4 inches (10 cm)		

* Temporary top growth control. Plants may return from surviving growing points.
** Extended top growth control.
*** Season long control.
† The company does not provide guidelines for weed densities. When in doubt as to the infestation level, use the high rate or contact the manufacturer.

Second Application:
A second application of up to 1.62L per acre may be made to fields that were treated initially with *Liberty* to a maximum total combined rate of 2.97 L per acre (1.35 L + 1.62 L). DO NOT apply more than 2.97 L per acre of *Liberty* in one season.

Application Information:

Water Volume:
Ground applications: 45 L per acre.
Aerial applications:
In Liberty Link canola use 22 L per acre.

Nozzles and Pressure:
Ground Application: Use 40 psi (275 kPa) when using conventional 80° or 110° flat fan nozzles; 45 psi (310 kPA) when using check valves. Angle nozzles forward at 45° to improve coverage of vertical leaf surfaces. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE medium or larger*** droplets.

Aerial applications: DO NOT use raindrop nozzles. Use a combination of nozzles and pressure to provide ***ASABE coarse*** or larger droplet size distribution.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Liberty 150SN activity is influenced by environmental conditions. Cool temperatures (less than 10°C), drought, and low humidity conditions slow weed growth. Applications made under these stressed conditions may result in reduced weed control.

Tank Mixes:

Herbicides:
Clethodim (*Centurion* or *Select* only) (25.5 mL/acre or 120 acre/case).

Consult *Liberty 150SN* label for exact weeds controlled. For *Centurion* or *Select* tank mix add ***Amigo*** to the tank first at 0.5 L per 100 L spray solution followed by Liberty and then *Centurion* or *Select*. Consult label for specific mixing instructions

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *Liberty 150SN* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Bayer CropScience also supports the following mixes that are not on the *Liberty* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides: *Centurion (50 mL/acre).*

Insecticides: *Decis, Sevin XLR.*

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 4 hours may reduce control.

Re-Entry: DO NOT re-enter treated areas for 24 hours after application, without protective clothing as for spraying.

Grazing: DO NOT graze the treated crop or cut for feed.

Re-cropping: No restrictions.

Aerial Application: May be applied by air.

Storage: DO NOT freeze.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	0	1
Fixed wing airplane or Helicopter	1	0	30

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

DO NOT apply when dead calm or when winds exceed 16 km/hr when using unprotected booms or applying by air, or exceeding 25 km/hr when using shrouded booms.

Tank Cleaning:

Refer to tank cleaning section on page 14.

Hazard Rating:

◈ Warning – Poison

▽ Caution – Skin Irritant

◇ Warning – Eye Irritant

For an explanation of the symbols used here see page 11.

Liberty 200 SN

Herbicide Group
10 - glufosinate
(Refer to page 38)

Company:

Bayer CropScience (PCP#25337)

Formulation:

200 g/L of glufosinate ammonium formulated as a solution.

Container sizes: 10 L

Crops and Staging:

Liberty 200 SN **tolerant Corn only:** 1 to 8 leaf stage. Refer to product label for appropriate method of determining crop leaf stage.

Weeds Rates and Staging:

Weeds controlled with 0.61 L per acre rate

WEED	WEED STAGE (from emergence to stage)
Cocklebur	4 leaf
Green foxtail, Proso millet, Ragweed	5 leaf
Redroot pigweed, Shepherd's-purse	6 leaf
Chickweed	8 leaf

Weeds controlled with 0.81 L per acre rate

WEED	WEED STAGE (from emergence to stage)
Perennial sow-thistle, Wild buckwheat, Wild mustard, Wild oat, Yellow foxtail	4 leaf
Barnyard grass, Eastern black nightshade	5 leaf
Canada thistle*, Field bindweed*, Lady's-thumb, Lamb's-quarters, Wormseed mustard	6 leaf
Ragweed	7 leaf
Stinkweed	8 leaf

* season long suppression.

Weeds controlled with 1.0 L per acre rate

WEED	WEED STAGE (from emergence to stage)
Quackgrass**	4 leaf

** season long suppression, apply with ammonium sulphate, 2.4 L per acre (49% solution) or 1.2 kg per acre (99%).

Second Application:
A second application may be made to fields treated initially with up to 1 L per acre, if weeds and crop are at the correct leaf staging. DO NOT apply more than 1.8 L per acre *Liberty 200SN* to a crop in a single season.

Split Application Program:
For season long control of the weeds above a split application of *Liberty 200SN* may be employed. The first application must be a minimum of 0.81 L per acre made at the correct weed staging. For the second application of a 0.51 L per acre rate may be used. The second application timing must be made as soon as the second flush of weeds occurs and before the maximum leaf stage for the crop.

Application Information:

Water Volume: A minimum of 45 L per acre.

Nozzles and Pressure: Use 25 to 40 psi (175 to 275 kPa) when using conventional 80° or 110° flat fan nozzles. Angle nozzles forward at 45° to improve coverage of vertical leaf surfaces. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE medium*** droplets.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Liberty 200SN activity is influenced by environmental conditions. Cool temperatures (less than 10°C), drought and low humidity conditions slow weed growth. Applications made under these stress conditions may result in reduced weed control.

Weed control may also be reduced when heavy dew, fog, or mist are present at the time of application.

Tank Mixes:

None registered.

Restrictions:

For use on glufosinate-ammonium tolerant field corn only.

Rainfall: Within 4 hours of application may reduce control.

Re-Entry: DO NOT re-enter treated areas for 24 hours after application, without protective clothing as for spraying.

Grazing: DO NOT graze treated fields within 20 days of application.

Preharvest Interval: Leave 86 days between application and grain harvest.

Re-cropping: No re-cropping restrictions the year after treatment.

Aerial Application: DO NOT apply by air.

Storage: DO NOT freeze.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	0	1

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy. Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Handheld or backpack applications do not require a buffer.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Caution – Poison

Caution – Skin Irritant

Warning – Eye Irritant

For an explanation of the symbols used here see page 11.

Linuron*

Herbicide Group
7 - linuron
(Refer to page 38)

Company:

Tessenderlo Kerley Inc. (*Lorox L*)

United Agri Products (*Linuron 400*)

The following recommendations are a blend of recommendations of all linuron products. Consult the individual product labels for specific recommendations.

** NOTE: The Pest Management Regulatory Agency has re-evaluated linuron products and have proposed to phase out the use of all linuron products. As a result of this phase out, this page may not appear in future editions of this publication.*

Formulations:

***Linuron 400* (PCP#15544):** 400 g/L linuron formulated as a suspension concentrate.
Container size - 10 L.

***Lorox L* (PCP#16279):** 480 g/L linuron formulated as a suspension concentrate.
Container size - 10 L.

Crops, Rates and Stages:

Post-emergent applications only:

CROP	STAGE	LINURON 400 (L/acre)	LOROX L (L/acre)
Spring wheat (including durum), oats and barley*	2 to 4 leaf stage	0.20 to 0.26	0.17 to 0.22
Field corn (post-emergent** directed spray, do not spray over top of corn)	Apply when corn is at least 15 inches (38 cm) high (highest leaf on free standing plant)	1.16 to 2.18	0.97 to 1.82
Caraway, coriander	Apply when in the 2 to 4 leaf stage	—	0.50 to 0.67
Dill†	Apply when dill has at least 2 full leaves developed	—	0.77 to 1.9
Shelterbelts (caragana, green ash, Siberian and American elm, Manitoba maple, poplar, willow, white spruce, Colorado spruce, Scots pine)	Apply as an overall spray to dormant stock or as a directed spray if buds have broken.	2.18	1.82
Short Rotation Intensive Poplar	Apply as a directed spray under plants that have been established for 1 year or more	—	1.82

* Only when tank mixed with *MCPA* amine at 0.34 to 0.45 L per acre (500 formulation) or 0.4 to 0.57 L per acre *MCPA K* (400 formulation).

** Use lower rate when weeds do not exceed 2 inches (5 cm) and higher rate for weeds up to 8 inches (20 cm) in height, preferably before they are 5 inches (13 cm) high. Requires the addition of a mineral oil surfactant blend at 1 to 2 L per 100 L or spray solution or spray oil at 1 to 2 L per 10 L of spray solution. See oil labels for directions. DO NOT apply if *linuron* has been applied pre-emergent.

† A split pre-emergent/post emergent application of *linuron* may be made in dill. See below for more information.

Pre-emergent surface (not incorporated) applications for use on loam to clay soils only:

	LINURON 400 (L/acre)		LOROX L (L/acre)	
Soil organic matter	***less than 2%***	***from 2 to 5%***	***less than 2%***	***from 2 to 5%***
Field corn	1.09*	1.58	0.91*	1.31*
Soybeans	1.09 to 1.58	1.58 to 2.18	0.91 to 1.31	1.31 to 1.82
Sweet white lupins	1.01	1.50	0.85	1.25
Potatoes	1.11 to 1.72	1.72 to 2.22	0.91	1.82
Dill†	—	—	0.53 to 0.77	0.77 to 1.0

* Must be tank mixed. Refer to specific labels for registered tankmix partners.

† A split pre-emergent/post emergent application of *linuron* may be made in dill. See below for more information.

If used on sandy soils, severe crop injury may result.
Seed the crop at least 2 inches (5 cm) deep. Make only one application per year to field crops.
When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Split applications:
This product may also be applied to dill as a split pre/post-emergent application. A pre-emergent surface application of up to 0.77 L per acre, followed by a second post-emergent application, no sooner than two weeks after the first, of up to 1.0 L per acre. Minimum staging for post-emergent applications given above still applies.

Banded Applications:
This product may also be applied in a narrow band directly over the row in wide rowed crops if another method is to be used for weed control in between the rows. For band treatment, use proportionately less; for example, for 10 inch band on 30 inch row, use 1/3 of the broadcast rate.

Weeds and Staging:

Post-Emergence

When tank mixed with* MCPA *amine in cereals, the following weeds are controlled:

Chickweed
Corn spurry
Cow cockle
Flixweed
Green foxtail (suppression possible)
Green smartweed
Hemp-nettle
Lady's-thumb
Lamb's-quarters
Ragweed (common, giant)
Redroot pigweed
Shepherd's-purse
Stinkweed
Stork's-bill
Tartary buckwheat
Wild buckwheat

Apply when annual broadleaf weeds are in the 2 to 4 leaf stage and when green foxtail is in the 1 to 3 leaf stage.

In shelterbelts, apply when weeds are less than 4 inches (10 cm) tall.

Pre-emergent surface treatments and Post-emergent applications in corn and shelterbelts:
Sufficient moisture (1 to 2 inches or 3 to 5 cm) in the form of rainfall or irrigation is necessary within 7 to 10 days of a pre-emergence application or poor weed control will result.

Barnyard grass*
Common chickweed
Common groundsel■
Corn spurry■
Crabgrass*
Dandelion (seedlings only)■
Foxtail (green and yellow)*
Goosefoot
Knotweed
Kochia■
Lamb's-quarters
Pigweed (prostrate■, redroot)
Plantain (seedlings only)■
Purslane
Ragweed (common)
Shepherd's-purse
Smartweed (annual)
Sow-thistle (annual, perennial■ seedlings only)
Stinkweed°
Wild buckwheat
Wild radish■
Witchgrass
Wormseed mustard

*partial control
■ Not registered with *Lorox L.*
° Not registered with *Linuron 400.*

Application Information:

Water Volume:
Post-emergent:
Cereals, coriander & caraway: 40 L per acre.
Field Corn directed spray: 69 to 138 L per acre.
Dill: 89 to 178 L per acre
Pre-emergent surface: 81 to 162 L per acre.

Shelterbelts: 90 to 180 L per acre.

Nozzles and Pressure: 30 to 40 psi (200 to 275 kPa) when using conventional stainless steel flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift. Use a 50 mesh or coarser line strainers and screens.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

In post-emergent applications the best weed control occurs when temperatures are moderate, when relative humidity is high and when soil moisture is adequate. Injury to cereals (crop lightening) will occur when the crop is under stress because of drought or disease. This injury is worse when the product is applied at advanced leaf stages. In pre-emergent surface treatments, rainfall or irrigation (1 to 2 inches or 3 to 5 cm) is required to move linuron into the root zone of germinating seeds. Insufficient moisture will result in poor weed control. Drought conditions after application will result in little to no weed control. If rainfall does not occur within 7 to 10 days of application and prior to crop emergence, a shallow rotary hoeing (0.75 to 1.5 inches/ 2 to 4 cm) should be made to mix the top layer of soil to help activation. Avoid covering treated ground with un-treated soil. If unusually heavy rain follows application, severe crop injury may result from herbicide in the root zone of the crop. DO NOT use on sandy soils or severe crop injury will result.

Tank Mixes:

Herbicides:
In Cereals: For post-emergent applications in cereals, linuron must be tank mixed with *MCPA* amine or *MCPA K*. DO NOT tank mix with other herbicides.
In Corn: *Atrazine, Dual II Magnum* and *Primextra II Magnum*. Not all linuron products have the same tank mix options, refer to specific labels.

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the linuron labels only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No rainfast period is specified on the label for post-emergent applications; required interval may be up to 8 hours. Pre-emergent applications require rainfall for activation. Contact manufacturer for more information.

Grazing: DO NOT graze treated crops or cut for feed prior to crop maturity.

Preharvest Interval:
Sweet Corn: DO NOT harvest within 50 days of treatment.
Field Corn: DO NOT harvest within 60 days of treatment or until after tassle emergence.
Caraway, Coriander & Dill: DO NOT harvest within 60 days of treatment.

Re-cropping: If the intended crop fails, fields treated with pre-emergent surface applications of linuron, may be seeded back to corn, soybeans, sweet white lupins, or potatoes. Till the soil thoroughly before reseeding. No restrictions 1 year after treatment.

Aerial Application: DO NOT apply by air.

Storage: DO NOT store liquid *Linuron* formulations at temperatures below 5°C. *Lorox L* may be frozen.

Tank Cleaning:

Refer to page 15.

Lontrel 360

Herbicide Group
4 - clopyralid
(Refer to page 38)

Company:

Dow AgroSciences (PCP#23545)

Formulation:

360 g/L clopyralid formulated as a solution.

Container size - 3.4 L, 4.45 L, 110 L, 115 L, 208 L, 454 L, Bulk

Crops Rates and Staging:

Applications of 0.17 to 0.23 L per acre:
Barley, spring wheat (NOT including durum), oat - 3 to flag leaf emergence stage.

Applications of 0.23 to 0.34 L per acre:
Flax, solin (low linolenic acid flax) - 2 to 4 inches (5 to 10 cm) in height.

Applications of 0.17 to 0.34 L per acre:
Canola - 2 to 6 leaf stage. Apply *Lontrel* to canola (Argentine – *B. napus* and Polish – *B. rapa*) varieties only; application to any other canola type oilseeds may result in injury to the crop.
Seedling forage grasses* - 2 to 4 leaf stage.
Established grasses* - at the shot blade stage, or in the fall after harvest or in early spring.

Seedling and established grasses* for forage and seed production include:

Bromegrass (smooth)
Fescue (creeping red, meadow, tall)
Kentucky bluegrass
Meadow foxtail
Orchardgrass
Reed canarygrass
Timothy
Wheatgrass (crested, intermediate, slender, streambank, tall**)
Wildrye (Altai, Russian)

Applications of 0.34 L per acre:
Summerfallow – Stage according to weeds.
Shelterbelts* containing villosa lilac, acute willow, Colorado spruce, white spruce, buffaloberry and chokecherry.*

Plantation poplar (including hybrid poplar)*

* *NOTE: Since these uses are registered under the User Requested Minor Use Label Expansion program, the manufacturer assumes no responsibility for herbicide performance.* ***Users of this product for these uses do so at their own risk.***

** for forage use only

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds, Rates and Staging:

The following weeds will be controlled at 0.17 L per acre when young and actively growing:

Alsike clover
Vetch (Vicia sp.)

The following weeds will be controlled from 0.23 to 0.34 L per acre when young and actively growing:

Common groundsel
Common ragweed
Perennial sow-thistle (top growth only)
Scentless chamomile
Wild buckwheat
Volunteer alfalfa -2 to 20 inches (5 to 50 cm) tall

Canada thistle - after all thistles have emerged and when the majority are in the rosette to pre-bud stage;

0.17 L per acre	Provides top growth control of Canada thistle for 6 to 8 weeks.

0.23 L per acre	Provides season long control of Canada thistle. Not all root stalks will be killed and some regrowth may occur by the end of the growing season.
0.34 L per acre	Provides season long control of Canada thistle with suppression into the following year.

Spotted and diffuse knapweed is controlled up to flower emergence at 0.28 L per acre.

Sheep sorel and oxeye daisy is controlled at 0.34 L per acre.

Application Information:

Water Volume: 40 to 89 L per acre.

Nozzles and Pressure: Maximum 30 to 40 psi (200 to 275 kPa) with conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressures designed to deliver thorough, even coverage with ***ASABE coarse*** droplets.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Poor control may occur under dry conditions. Injury to flax may occur when tank mixing with *MCPA*. To reduce the risk of crop injury, DO NOT apply tank mixes if temperature exceeds 27°C.

Tank Mixes:

Herbicides:

Lontrel applications following applications of products containing bromoxynil (*Approve, Badge, Bromotril, Buctril M, Koril, Logic M, Mextrol, Pardner, Thumper*) should be delayed by 14 days to allow the Canada thistle to recover from leaf burn.

Recommended rates of *Lontrel* may be used for each crop unless otherwise indicated.

In Canola:
Poast Ultra plus *Merge* adjuvant.
Select plus *Amigo* Adjuvant (Lontrel at 0.17 to 0.34 L/acre).

In Canola (ROUNDUP READY varieties only):
*Roundup Transorb** (Lontrel at 0.112 L/acre).

In Canola (CLEARFIELD varieties only):
*Odyssey*** (Lontrel at 0.17 to 0.23 L/acre).

* Roundup Ready varieties only
** CLEARFIELD varieties only

In Flax:
Poast Ultra plus *Merge* adjuvant.
Poast Ultra + *MCPA* Ester (rates as above)
Select plus *Amigo* adjuvant.
Lontrel at 0.17 L/acre for the following mix:
MCPA amine or ester (0.28 to 0.38 L/acre - 600 g ae/L formulation)

In Spring wheat (NOT including durum) and barley:
Lontrel at 0.11 to 0.17 L/acre for the following mix:
2,4-D or *MCPA* (amine or ester) at label rates.

In Oat:
MCPA amine or ester (*Lontrel* at 0.11 to 0.17 L/acre).

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *Lontrel* label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Dow AgroSciences also supports the following mixes that are not on the *Lontrel* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides: *Assure II, Muster, Muster+any of Assure II, Clethodim, Poast Ultra, Pursuit, Solo.*

Adding ingredients in the correct order is critical for optimum performance.

Check labels of products to be mixed for directions.

General guidelines can be found on page 14.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Crops or areas treated with this product may be grazed immediately following treatment.

Re-cropping: *Lontrel* residues in the soil may affect succeeding crops. The year after application, replant to wheat, barley, oats, rye, flax, forage grasses, mustard or canola.

DO NOT use manure from animals fed or bedded with *Lontrel*-treated straw, except on fields that are to be sown to *Lontrel*-tolerant crops.

Aerial Application: DO NOT apply by air.

Storage: Store in heated storage. If product is frozen, bring to room temperature and agitate before use.

Buffer Zones: Avoid contamination of or drift toward non-target land, water or irrigation ditches.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Caution – Poison

Danger – Eye Irritant

For an explanation of the symbols used here see page 11.

MCPA

Herbicide Group

4 - MCPA

(Refer to page 38)

Company and Formulation

IPCO (600 Ester** - PCP#27802; 500 Amine* - PCP#20308; 400 (K) Potassium salt* - PCP#20305; 300 (Na) Sodium salt* - PCP#20306)

Nufarm Agriculture (600 Ester** - PCP#27803; 600 Amine* - PCP#28384; 300 (Na) Sodium salt* - PCP#14718)

UAP (600 Ester** - PCP#27804; 500 Amine* - PCP#9516; 300 (Na) Sodium salt* - PCP#9858)

Viterra (600 Ester** - PCP#29001; 500 Amine* - PCP#29244)

Farmers of North America (MPower MCPA Ester 500 ** – PCP#30462; MPower MCPA 500 Amine* – PCP#30461)

* formulated as a solution.

** formulated as an emulsifiable concentrate.

Crops, weeds and rates and other application details may differ with different product labels. Consult specific product labels for more information.

Crops, Rates and Staging:

The maximum safe rates for various crops are given below. Higher rates used for harder to control weeds (see "Weeds, Rates and Staging") may cause crop injury. Application rates for individual products may vary from those listed. Refer to the label for product specific use rates. Rates greater than these for harder to control weeds may cause crop injury. When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

CROP	STAGE	RATE (L/ACRE)			
		AMINE 500	AMINE or ESTER 600	K SALT	Na SALT
Wheat (spring and durum), barley	3 leaf to early flag leaf.	0.45	0.42	0.53	0.81
Oats	3 leaf to early flag	0.45	0.36	0.53	0.81
Spring rye	2 leaf to early flag leaf.	0.45	0.42	0.53	0.81
Flax (not Solin varieties)	2 inches (5 cm) in height to prebud stage. Apply at 2 to 4 inches (5 to 10 cm) in height for maximum crop tolerance.	0.4	0.28 (E) or 0.34 (A)	0.65	0.71
Winter wheat (WW), fall rye (FR)	In spring, apply from the time growth commences until the early flag leaf stage.	0.45	0.42	0.61 (WW) 0.40 (FR)	0.81
Corn	As a broadcast spray up to 6 to 7 in. (15 to18 cm) tall or 6 leaf stage. Up to 3 weeks before tassling as a directed spray using drop nozzles.	0.45	0.37 (Amine only)	0.51	0.61
Peas	Vines 4 to 7 inches (10 to 18 cm) long. For short-statured, determinate flowering peas, apply at the early stages within this range.	0.22*	0.17 (Amine only)	NR	0.36*
Cereals underseeded to alfalfa (not Flemish varieties)	Apply when the majority of seedling legumes are in the 1 to 3 trifoliate leaf stage.	0.22	0.19 (Amine only)	NR	0.4
Underseeded alsike, ladino and red clover	Apply when the majority of seedling legumes are in the 1 to 3 trifoliate leaf stage.	0.28	NR	NR	0.4

(E) or (A) indicates *Ester* or *Amine* formulations.

Crops, Rates and Staging continued on next page.

Crops, Rates and Staging *continued*

CROP	STAGE	RATE (L/ACRE)			
		AMINE 500	AMINE or ESTER 600	K SALT	Na SALT
Red clover◇ Seedling (seed and forage) Established◇ (seed only)	Seedlings: 1 to 3 trifoliate stage. Do not feed to livestock in the first year. Established: Apply at the breaking of dormancy in the spring up to 7.5 cm.	0.23	0.19 (Amine only)	NR	NR
Grass pastures	Spring or fall.	1.42	1.13 (E) or 1.42 (A)	NR	0.71
Seedling forage** grasses (not for seed)	Apply from the 3 leaf stage to the shot blade stage.	0.45**	NR	NR	NR
Established forage** grasses (not for seed)	Apply in the spring up to the shot blade stage or in the fall after harvest.	0.45**	NR	NR	NR

(E) or (A) indicates *Ester* or *Amine* formulations.

NR = Not Registered

* The rates given are lower than the registered rates for peas. Less than the maximum label rates are recommended because of crop injury concerns.

** *MCPA* is NOT registered for use on forage grasses, any such use is entirely at the risk of the user.

◇ Nufarm Agriculture *MCPA Amine* only.

Formulation Characteristics:

Formulation	Risk of Vapour Drift	Activity on Weeds	Risk of Crop Injury
LV Ester	Medium	Fast	Medium
Amine	Very Low	Medium	Low
Salts	Very Low	Slow	Very Low

Weeds, Rates and Staging:

Apply at lower rates when weeds are small (2 to 4 leaf stage) and actively growing. Higher rates are needed when weeds are larger, in heavy populations, or growing under stressful conditions (excessively cold, hot, dry or wet).

NOTE: The following rates are a general range for all products. Rate ranges for individual products may differ slightly. Consult the product label for specific rates for each application.

+ Not controlled by *MCPA K salt* formulation
++ Not controlled by *MCPA K* or *Na salt* formulations

Susceptible weeds:

Amine 500 formulations – 0.28 to 0.45 L per acre
Amine and Ester 600 formulations – 0.24 to 0.36 L per acre
K formulations – 0.61 to 0.71 L per acre.
Na formulations – 0.5 to 0.81 L per acre.

Burdock
Cocklebur
Flixweed (late fall applications or small seedlings)*
Kochia
Lamb's-quarters
Mustards (except dog and tansy)
Prickly lettuce+
Ragweed
Russian pigweed
Shepherd's-purse*
Stinkweed*
Wild Radish
Wild Sunflower+

* Winter annual weeds

Harder to control weeds:

***Amine 500 formulations* – 0.45 to 0.71 L per acre.**
***Ester 600 formulations* – 0.42 to 0.61 L per acre.**
***K formulations* – 0.71 to 0.81 L per acre.**
***Na formulations* – 0.81 to 1.1 L per acre.**

Annual sow-thistle+
Biennial wormwood+
Bluebur+
Common peppergrass+
Curled dock+
Flixweed (overwintered rosettes prior to bolting)+
Goat's-beard+
Goosefoot+
Hemp-nettle (suppression only)
Mustard (dog and tansy)+
Plantain+
Purslane+
Redroot pigweed+
Smartweed (annual)+
Tumble pigweed+

Top growth control only (rates as for harder to control weeds):

Blue lettuce+
Canada thistle
Corn spurry++
Dandelion++
Gumweed+
Field bindweed+
Field horsetail++
Hedge bindweed+
Hoary cress+
Leafy spurge+
Perennial sow-thistle+
Russian thistle++

Application Information:

Water Volumes:

Cereals, flax, pastures, forage grasses: 40 to 81 L per acre.
Peas: Minimum 61 L per acre.
Cereals Underseeded to Forage Legumes: 61 to 81 L per acre.

Nozzles and Pressure: Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver thorough, even coverage with ***ASABE coarse*** droplets.

Tank Mixes:

Herbicides:

In Wheat and barley:
Avenge (500 ester only).
Banvel II (amine and K salt only).
Pardner (K salt only).
Linuron and *Sencor* (500 amine only).

In Oats:
Pardner (K salt only).
Linuron (500 amine only).

Not all brands are labelled for tank mixing. Check the product label prior to use for registered mixes and rates. Follow all precautions and restrictions on both labels.

Fertilizers: Liquid nitrogen (28-0-0) may be used in place of water as a carrier with certain amine formulations for application in spring to winter wheat or fall rye.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *MCPA* labels only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 6 hours of *MCPA Na salt* or *MCPA K salt*, 4 hours of *MCPA amine*, or 2 hours of *MCPA ester* application will reduce control.

Re-Entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze within 7 days of application.

Re-cropping: No restrictions the year after application.

Aerial Application: Some products may be applied by air to specific crops. Check the label for detailed instructions.

Storage: *MCPA ester* may be frozen. DO NOT freeze *MCPA amine, MCPA sodium salt* and *MCPA K.*

Buffer Zones:

Crop	Application method	Buffer Zones (metres†) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Cereals, Flax	Ground*	1	1	4
	Fixed wing aircraft	1	0	60
	Helicopter	1	0	50
Legume forages	Ground*	1	1	4
	Fixed wing aircraft	1	1	25
	Helicopter	1	1	25
Stubble, pastures	Ground*	1	1	4
	Fixed wing aircraft	15	0	60
	Helicopter	15	0	50

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy. Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Handheld or backpack applications do not require a buffer.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Best weed control occurs when temperatures are above 21°C (daytime) or 10°C (night time) and humidity is above 70 percent. DO NOT apply if temperature exceeds 27°C. If applying to flax, injury and a delay in maturity may result from application under hot or humid conditions. Extremely hard water may reduce performance or cause problems in spraying the product.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

◈ Warning – Poison

For an explanation of the symbols used here see page 11.

MCPB / MCPA

Herbicide Group
4 - MCPB & MCPA
(Refer to page 38)

Company:

IPCO (*Clovitox Plus* – PCP#24336)
Nufarm Agriculture (*Tropotox Plus* – PCP#8211)
UAP (*Topside* – PCP#22003)

Formulation:

375 g/L MCPB, 25 g/L MCPA present as sodium salts and formulated as a solution. **Container size** - 10 L.

Crops, Rates and Staging:

Registered for all products:
Apply 1.11 to 1.72 L per acre. Apply only that needed to control the target weeds.

DO NOT make more than one application of this or other product containing the same ingredients per year.

CROP	STAGE
Peas	3 to 6 expanded leaves.
Clover (alsike, ladino, red, white Dutch, wild white)	Monofoliate to 3 trifoliate leaf stage (with or without a cover crop).
Oats, wheat, rye or barley (alone or as a companion crop)	2 leaf to flag leaf stage.
Field corn	45 cm high to the start of tassling – use drop nozzles.
Established pasture	After grazing or cutting when weeds have regrown to a susceptible stage.

Seedling Forage Grasses:
Apply at 1.11 to 1.42 L per acre from the 2 to 4 leaf stage:

Bromegrass (smooth, meadow)
Fescue (altai, red, meadow, tall)
Green needlegrass
Reed canarygrass
Timothy
Wheatgrass (crested, creeping intermediate, northern, pubescent, slender, streambank, tall, western)
Wild rye (altai, Russian)

Registered for *Tropotox Plus*, and *Clovitox Plus* only:
Seedling alfalfa for seed production* at the 3 to 6 trifoliate stage.

NOTE: Seedling alfalfa vigour may be reduced in the year of treatment, however, the crop recovers and yield will not normally be affected.

** Since this use is registered under the User Requested Minor Use Label Expansion program, the manufacturers assume no responsibility for herbicide performance.* ***Users of this treatment on seedling alfalfa do so at their own risk.***

Weeds, Rates and Staging:

WEEDS	STAGE	RATE (L/ACRE)
Ball mustard, Lamb's-quarters, Stinkweed, Wild mustard, Wormseed mustard	Seedlings	1.11
Annual sow-thistle*, Hemp-nettle*, Redroot pigweed, Ragweed, Shepherd's-purse, Volunteer rapeseed (including canola), Wild radish*	Seedlings	1.72
Curled dock, Perennial sow-thistle**, Plantain	Rosette	1.72
Bull thistle	Rosette to early bud	1.72
Buttercup (Creeping, Tall), Field bindweed	In spring during rapid growth	1.72
Canada thistle	6 inches (15 cm) to early bud	1.72
Horsetail*	6 inches (15 cm)	1.72

* Suppression only
** Top growth control only

Application Information:

Water Volume:
Clovitox Plus: 71 to 91 L per acre.
Tropotox Plus, Topside: 61 to 81 L per acre.

Nozzles and Pressure: Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE coarse*** droplets.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Damage to peas or seedling forage legumes may occur if the crop is sprayed when under drought or disease stress. Under extremely hot or humid conditions, crop injury may be severe. DO NOT apply when temperatures are over 27°C. Best activity on weeds occurs in warm weather.

Tank Mixes:

None registered.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Re-Entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze crop treated with *Topside* or cut for hay in the year of establishment. Cereals or pastures treated with *Tropotox* or *Clovitox* may be used for grazing or cut for greenfeed or hay 30 days after application. Forage legumes and peas treated with *Clovitox* may be used for animal feed 30 days after application.

Re-cropping: No restrictions listed. Phenoxy herbicides can persist in soils for weeks, particularly if dry or cool weather persists. DO NOT seed sensitive crops immediately after spraying.

Aerial Application: *Clovitox* may be applied by air to established pasture and cereal crops (not underseeded to clover).

Storage: DO NOT freeze.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	4

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy. Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Handheld or backpack applications do not require a buffer.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Clovitox Plus:

Danger – Poison

Danger - Corrosive to eyes

Tropotox Plus & Topside:

Caution – Poison

Tropotox Plus:

Warning – Contains the allergen caseinate (milk)

For an explanation of the symbols used here see page 11.

Mecoprop-p

Herbicide Group
4 - mecoprop-p
(Refer to page 38)

Company:

United Agri-Products (*Mecoprop-P* – PCP#27891)
Nufarm Agriculture (*Compitox* – PCP#27824)

Formulation:

150 g/L mecoprop-p present as potassium salt. Container size - 10 L.

Crops and Staging:

Spring wheat (including durum), barley and oats - 3 leaf to flag leaf stage.

Weeds and Staging:

Apply to weeds from the 2 to 4 leaf stage.

Black medic*
Canada thistle (top growth control only)
Chickweed
Cleavers
Clover (volunteer)
Corn spurry
Lamb's-quarters*
Plantain
Wild mustard*

* not *Compitox*

Rates:

2.2 to 2.8 L per acre.

Use the high rate for weeds in an advanced stage of growth.

Application Information:

Water Volume: 81 to 121 L per acre.

Nozzles and Pressure: Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE coarse*** droplets.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Apply in warm weather under good growing conditions. Avoid spraying in very hot weather or in drought conditions.

Tank Mixes:

None registered.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: DO NOT graze or feed treated crop to livestock prior to crop maturity.

Re-cropping: No restrictions the year after application.

Aerial application: DO NOT apply by air.

Storage: DO NOT freeze.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	0	5

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy. Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Handheld or backpack applications do not require a buffer.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Caution – Poison

For an explanation of the symbols used here see page 11.

Metribuzin

Herbicide Group
5 - metribuzin
(Refer to page 38)

Company:

Bayer CropScience (*Sencor Solupak 75 DF, Sencor 75 DF*)
United Phosphorus Inc. (*TriCor 75 DF*)

Formulations:

***Sencor Solupak 75 DF* (PCP#20968) :** 75% metribuzin formulated as a dispersible granule. Container size - 2.5 kg (5 water soluble bags, 500 g each).

***Sencor 75 DF* (PCP#17242):** 75% metribuzin formulated as a dispersible granule. Container size - 2.5 and 5 kg.

***TriCor 75 DF* (PCP# 30661):** 75% metribuzin formulated as a dipersable granule. Container size 2.5 kg.

Crops, Rates and Staging:

CROP	APPLICATION TIMING	RATES (g/acre)
Barley	2 to 5 leaf stage.	80 to 152
Spring wheat (including durum)	2 to 5 leaf stage.	80 to 111
Winter wheat (Norstar only)	In late fall after tillers have developed (past the 3 leaf stage).	226 to 304
Peas (field and processing)*	Preplant incorporated (when tank mixed with *Rival* or *Treflan EC*).	**Spring:** 152 to 192 **Fall:** 190 to 223
Peas (field only)*	Post-emergence - up to 6 inches (15 cm) of vine length. For short-statured, determinate flowering peas, apply at the early stages within this range.	111 to 152
	Split post-emergent applications**.	**First split application:** 60 to 80 **Second split application:** 7 to 10 days later with rates within these ranges.
Lentils*	**Single or split applications**:** Plants up to 6 inches (15 cm) of vine length. For maximum crop tolerance, apply at the 1 to 4 above ground node stage.	111
		First split application: 60 to 80 **Second split application:** 7 to 10 days later with rates within these ranges.
Chickpeas*	Up to 2.5 inches (6 cm) in height, when vines have 1 to 3 above ground nodes. *Note: application past recommended growth stage may result in severe crop injury.*	111
Potatoes (except Belleisle or Tobique)***	Preplant incorporated (with *Eptam*).	152 to 223
	Pre-emergence in sprinkler irrigation systems (apply only in a tank mix with *Eptam 8-E*).	152 to 223

Crops, Rates and Staging continued on next page.

Crops, Rates and Staging *continued*

CROP	APPLICATION TIMING	RATES (g/acre)
Potatoes (except Atlantic, Belleisle, Eramosa, Tobique and red-skinned or early maturing varieties)***	Early post-emergence (up to 4 inches or 10 cm in height).	151
Soybeans***	Preplant incorporated (tank mixed with *Treflan EC*).	111 to 223
Fababeans	Preplant incorporated (tank mixed with *Treflan EC*).	**Spring:** 111 to 223 **Fall:** 190 to 223

* DO NOT use on lentils, peas or chickpeas seeded less than 2 inches (5 cm) deep or in soils with less than 4 percent organic matter.

** Under certain field or weather conditions a split application may provide better weed control and crop tolerance than single applications. The first application should be made at the cotyledon to 2 leaf stage of the weeds. The second application should be made when a second flush of weeds have emerged or if weeds which were more advanced at the time of the first application have started to show regrowth. The split applications are normally 7 to 10 days apart.

*** Consult manufacturer or seed supplier for varietal tolerances to *metribuzin* applications in soybean and potato.

Note: When *metribuzin* is tank mixed with *Trifluralin* in peas, fababeans, and soybeans, refer to product label for maximum rates that can be applied on light textured soils.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds, Rates and Staging:

Post-emergence applications should be made when weeds are small – 2 inches (5 cm) in height or diameter.

Split applications (postemergence on lentils and peas) – 1st application at cotyledon to 2 leaf stage of weeds. 2nd application (if necessary) 7 to 10 days after the first.

Post-emergence at 81 g per acre:
Weeds controlled in spring wheat, barley, field pea and suppressed in lentil and chickpea:

Chickweed
Green smartweed
Hemp-nettle*
Lamb's-quarters
Stinkweed
Volunteer canola
Wild mustard

Additional weeds controlled in spring wheat and barley only:

Lady's-thumb
Redroot pigweed

Post-emergence at 111 g per acre:
Weeds controlled in spring wheat, barley, potato, field pea, and suppressed in lentil and chickpea:
Weeds above plus:

Ball mustard
Corn spurry
Hemp-nettle
Tartary buckwheat

Additional weeds controlled in spring wheat and barley only:

Common groundsel
Night-flowering catchfly
Wormseed mustard

Post-emergence at 152 g per acre in spring wheat and barley only:
Weeds above plus:

Henbit
Russian thistle

Post-emergence at 152 g per acre in potatoes only:
Weeds listed for peas above plus:

Lady's-thumb
Redroot pigweed
Shepherd's-purse

Post-emergence at 226 to 304 g per acre in winter wheat controls:

Downy brome
Flixweed
Shepherd's-purse
Stinkweed

Preplant Incorporated in fababeans, lentils, field pea and soybean:
Must be applied in tank mix with *Treflan EC* or *Rival*):

Chickweed
Corn spurry
Green smartweed
Hemp-nettle
Lamb's-quarters
Stinkweed
Volunteer canola
Wild mustard

Plus weeds controlled by either *Rival* or *Treflan EC*.

* Use the high rate for best control.
** Suppressed only in lentils and chickpeas.

Application Information:

Water Volume:
Preplant incorporated: 40 L per acre.
Post-emergence applications:
Cereals - 40 L per acre.
Lentils, peas, chickpeas - 70 L per acre.

Nozzles and Pressure: Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets. If using conventional flat fan nozzles use a maximum of 30 to 40 psi (200 to 275 kPa) with opening no smaller than 8002 or TK2 with 50 mesh screens. For lentils, peas and chickpeas use nozzles no smaller than 8003 or TK3. Angle nozzles 45° forward to achieve better coverage of vertical weed targets.

Incorporation: All plant growth and stubble should be thoroughly worked into the soil before treatment. Apply directly to the soil surface. Two incorporations are required at right angles for thorough mixing. The first incorporation must be made within 24 hours of spraying. For fall applications, it is preferred that both incorporations be done in the fall. The second incorporation may be delayed until spring to conserve trash; however, both incorporations must be done the recommended depth.
Incorporate with a tandem disc, discer or field cultivator (Vibrashank type). Set equipment to work at a depth of 3 to 4 inches (8 to 10 cm). Operate disc implements at 4 to 6 mph (7 to 10 km/hr), cultivators at 6 to 8 mph (10 to 13 km/hr).

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions

Crop height reductions or yellowing may occur if high temperatures occur within 48 hours of application. Cold, cloudy weather or frost within 3 days of application will also aggravate injury. If frost occurs, allow 4 to 5 days for crop to recover prior to applying *metribuzin*. Heavy rainfall soon after application to peas, lentils and chickpeas can result in stand reduction on soils with less than 4 percent organic matter.

Tank Mixes:

Herbicides:

In spring wheat or barley:
Dicamba, Target, MCPA amine or *2,4-D amine*.

In potatoes (post emergent) Sencor 75 DF and TriCor only:
*Prism**

In potatoes (preplant incorporated):
Eptam 8-E (Required).

In fababeans (preplant incorporated):
Treflan EC (Required).

In soybeans (preplant incorporated):
Treflan EC (Required).

In peas:
Treflan (PPI)
Rival (PPI).
Sencor 75 DF or TriCor at 77 g/acre plus 0.19 L/acre *MCPA sodium salt* (300 g/L).

* Consult manufacturer or seed supplier for varietal tolerances to *metribuzin* and *Prism* tank-mix applications in potato.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *Sencor or TriCor* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Allow 5 days between application of *metribuzin* and application of other pesticides.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 6 hours may reduce control.

Re-Entry: DO NOT re-enter treated areas for 12 hours after application.

Grazing: DO NOT graze treated cereal crops within 30 days of application, or peas, chickpeas or lentils within 70 days of application.

Preharvest Interval: DO NOT harvest barley, wheat or potatoes within 60 days of application. DO NOT harvest lentils, chickpeas, or field peas within 70 days of application. DO NOT harvest processing peas or chickpeas within 40 days of application.

Re-cropping: Preplant incorporated treatments may leave a residue in the soil that will affect succeeding crops when using higher rates of product. DO NOT seed canola, sunflowers, onions, celery, peppers, cole crops, lettuce, spinach, red beets, turnips, pumpkin, squash, cucumbers or melons the year after treatment. Fall seeded crops may be injured when seeded the same year as preplant or post-emergence applications of these products.

Aerial Application: No restrictions on label. While aerial application is not specifically prohibited, it is not recommend by the manufacturer

Storage: May be frozen.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:			
	Aquatic Habitats of Depths			Terrestrial habitat
	Less than 1 m	1 to 3m	Greater than 3 m	
Ground only*	5	2	1	10

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured is metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Spray equipment must be thoroughly cleaned to remove traces of herbicide that might injure other crops to be sprayed. Drain any remaining spray solution from the spray tank. Rinse the spray tank and refill with water, adding a heavy-duty detergent at the rate of 0.25 L per 100 L of water. Recycle this mixture through the equipment for 5 minutes and spray out. Repeat this procedure twice. Fill the spray tank with clean water, recycle for 5 minutes, and spray out. Clean pump and nozzle screens thoroughly. Wash away any spray mixture from the outside of the spray tank, nozzles or spray rig.

Refer to page 14 for additional information.

Hazard Rating:

Keep out of reach of children.

Metsulfuron

Herbicide Group
2 - metsulfuron
(Refer to page 38)

Company:

E. I. duPont Canada (*Ally* - PCP#24388)
Cheminova Canada (*Accurate* - PCP#29242)

Formulation:

60% metsulfuron methyl formulated as a water dispersible granule.

Container size -

Ally: 122 g package (4 x 30.5 g water soluble bags).

Accurate: 120 g container.

Crops, Rates and Staging:

The following are maximum rates by crop. See the Weeds, Rates and Staging section for weeds controlled by rates less than the maximum.

Cereals – up to 3 g per acre, plus surfactant:

Wheat (spring and durum), barley: 2 leaf up to emergence of the flag leaf.

Established forage grasses for forage or seed production* - up to 3 g per acre, plus surfactant:

Apply from the 2 leaf to flag leaf stage and before canopy is dense enough to prevent thorough leaf coverage.

Crested wheatgrass*
Intermediate wheatgrass*
Creeping red fescue*
Orchardgrass*

Pasture and Rangeland – up to 12 g per acre

** NOTE - Since applications to forage grasses have been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance.* ***Application to forage grasses is at the risk of the user.***

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds, Rates and Staging:

Cereals and forage grasses:

Unless otherwise indicated, apply to weeds at the 2 to 4 leaf stage.

Alone or in tank mix with a grass control herbicide use 3 g per acre (One 122 g package treats 40 acres). A rate of 2 to 3 g per acre may be used when mixing with certain other herbicide (See **Tank Mixes:**). Add a non-ionic surfactant such as *Agral 90, Ag-Surf, Companion, Super Spreader* or *Citowett Plus* at 0.2 L per 100 L spray volume.

Weeds Controlled:

Ball mustard
Bluebur
Chickweed
Common groundsel
Corn spurry
Cow cockle
Flixweed
Green smartweed
Hemp-nettle
Kochia†
Lady's-thumb
Prostrate pigweed
Redroot pigweed
Scentless chamomile
Shepherd's-purse
Stinkweed
Stork's-bill
Tartary buckwheat
Volunteer canola*
Wild mustard

* CLEARFIELD varieties will be controlled only with the addition of *2,4-D* or *MCPA*.

Weeds Suppressed:

Canada thistle**
Lamb's-quarters◊
Russian thistle◊
Sow-thistle (annual and perennial)**
Toadflax
Wild buckwheat***

** Apply when thistles are less than 6 inches (15 cm) tall.
*** Apply to wild buckwheat up to the 3 leaf stage.
◊ Apply when weeds are less than 3 inches (8 cm) tall.

† *NOTE: Surveys of fields with kochia have found that roughly 90% of these kochia populations were resistant to Group 2 herbicides. Without testing that confirms otherwise, assume that kochia in your field is likely resistant as well and is unlikely to be controlled by* metsulfuron *alone.*

Pastures and Rangelands:

Western snowberry - 10 g per acre
Wild rose - 12 g per acre

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume:

Cereals and forage grasses: Minimum 40 L per acre.
Pastures and Rangelands: 40 to 91 L per acre.

Nozzles and Pressure: No application pressures are recommended by the manufacturer. Typical application pressures for standard flat fan nozzles are from 35 to 40 psi (240 to 275 kPa). Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressures designed to deliver proper coverage with ***ASABE medium*** when applying to annual crops and ***ASABE coarse*** droplets when applying to range and pasture. Use a 50 mesh and filter system.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Metsulfuron may injure crops stressed by heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures, drought, or water-saturated soils, either before or after application. Weed control will be reduced under dry, cold conditions.

Tank Mixes:

DO NOT mix the soluble bags with any substance containing boron or which releases chlorine.

Herbicides:

In wheat and barley:

2,4-D Amine or Ester (up to maximum rate for susceptible weeds on 2,4-D page), plus surfactant*.
Avenge (1.72 L/acre), no surfactant required*.
Avenge + MCPA Ester, no surfactant required*.
MCPA Amine or Ester (0.28 to 0.45 L/acre - 500 g/L formulation), plus surfactant.

In spring wheat (including durum):

Puma^{120} *Super* (0.15 to 0.31 L/acre), no surfactant required.

In spring wheat:

Horizon 240 EC (95 or 115 mL/acre) plus *Score* adjuvant*

In creeping red fescue:

Assure II (0.2 to 0.3 L/acre) plus *Sure-Mix* adjuvant*.

Consult tank mix partner labels for additional crop staging and variety restrictions.

* Use with the 3 g per acre rate of metsulfuron only.

Insecticides: None registered.

Fungicides: None registered.

Fertilizer: None registered. DO NOT mix the soluble bags with fertilizers.

Note: The above mixes are those listed on the *Metsulfuron* labels only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Rain within 4 hours of application of tank mixes with *2,4-D* amine, 2 hours of application of tank mixes with 2,4-D ester, will reduce weed control.

Re-entry: DO NOT enter treated fields for 12 hours.

Grazing: No restrictions.

Re-cropping: Refer to table on the opposite page. The following re-cropping intervals, based on soil pH, should be considered as guidelines only. *Metsulfuron* residues may affect crops for a longer period of time than outlined in the following table. Add 12 months to recommendations if less than 5 inches (130 mm) of rainfall in brown and dark brown soils or less than 10 inches (250 mm) rainfall in black or grey wooded soils in any year following application.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool, dry place. May be frozen.

Buffer Zones:

Use	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat**
	Less than 1 m	Greater than 1 m	
Cropland	1	1	15
Pasture and Range use	1	1	10

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

** Terrestrial buffers are not required for transport and utility rights of way

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Handheld or backpack applications do not require a buffer.

Caution:

Metsulfuron residues can persist for long periods, potentially limiting re-cropping options. Degradation of *metsulfuron* is dependent on the pH, moisture, and temperature of the soil. Refer to the label for details on rotation and minimum re-cropping intervals.

MINIMUM RE-CROPPING INTERVAL (MONTHS)

SOIL PH	BARLEY, WHEAT	OAT*	CANOLA*	FLAX*	LENTILS	CANARY-SEED	YELLOW MUSTARD
less than 7.0	10	10	10 (22)	10 (22)	34	48	48
7.0 -7.9	10	10 (22)	22 (34)	34	48	48	48

* Figures in brackets refer to re-cropping intervals in brown and dark brown soil zones.

ALL OTHER DATA refer to re-cropping intervals in all soil zones. On black and grey wooded soils with pH of 7.5 or less, fescue may be planted 10 months after application and alfalfa, red clover, peas and flax may be planted 22 months after application. DO NOT use on soils with pH greater than 7.9.

Effects of *metsulfuron* residues on crops other than those listed in the table have not been fully evaluated. Because of the length of re-cropping restrictions and the lack of information on many rotational crops, *metsulfuron* is not recommended for use on farms where special crops are grown (such as fababeans, beans, sunflowers, buckwheat, corn, potatoes, sugar beets, etc.).

Tank Cleaning:

Metsulfuron can cause severe injury to sensitive crops at very low concentrations. Sprayers used to apply *metsulfuron* should be flushed out immediately after *metsulfuron* is used. The manufacturer recommends that sprayers used to apply this product be flushed 2 times with a water/household ammonia rinse (1 L of 3% ammonia per 100 L water). All nozzles, screens and filters should be removed and cleaned after applying this product.

DO NOT clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

For additional information Refer to page 15.

Hazard Rating:

▽ Caution – Poison

▽ Caution – Eye Irritant

For an explanation of the symbols used here see page 11.

Momentum

Herbicide Group
4 - clopyralid & fluroxypyr
(Refer to page 38)

Company:

Viterra (PCP#30456)

Formulation:

90 g/L clopyralid and 90 g/L fluroxypyr formulated as an emulsifiable concentrate.

Container size: 8 L.

Crops and Staging:

Apply at the 3 leaf to just before the flag leaf stage of barley, wheat (spring , durum).

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

The following weeds are controlled at the 1 to 4 leaf/whorl stage unless specified:

Canada thistle**
Cleavers
Kochia (2 to 8 leaf)
Stork's-bill (1-8 Leaf)*
Volunteer flax (1 to 12 cm)
Wild buckwheat

* Suppression only.

** Season long control, some regrowth may occur in the fall. Apply from the 4 inch (10 cm) to pre-bud stage.

Rates:

0.45 L per acre

Apply a maximum of this product or other products containing either clopyralid or fluroxypyr.

Application Information:

Water Volume: 40 L per acre.

Nozzles and Pressure: Use 30 to 40 psi (200 to 275 kPa) if applying without drift reduction nozzles. Drift reduction nozzles may require higher pressures for proper performance. Select the nozzle and pressure combination that produces of ASABE coarse droplets while maintaining good coverage of foliage.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

When weeds are stressed because of drought, flooding, hot or cool (less than 8°C) temperatures, weeds are not actively growing and control may be reduced. DO NOT apply to weeds stressed longer than 20 days from lack of moisture as poor control can result.

Tank Mixes:

Herbicides:
MCPA Ester 500 (0.34 to 0.45 L/acre)
MCPA Ester 600 (0.28 to 0.38 L/acre)

***Momentum* alone or tank mixed with MCPA ester rates above may be mixed with the following:**

In spring wheat (including durum) and barley:
Tralkoxydim (0.20 L/acre) plus registered adjuvant
Imazamethabenz (0.52 to 0.64 L/acre) plus water pH adjuster
Fenoxaprop 120 EC (0.16 to 0.31 L/acre).

In spring wheat (not including durum) and barley:
Axial 100EC (0.24 L/acre) plus *Adigor* adjuvant.

In spring wheat (including durum):
clodinafop (label rates)
Simplicity (0.2 L/acre)
Traxos (label rate)

In spring wheat (NOT including durum):
Everest 70WDG (17.4 g/acre) plus *Ag-Surf* or *Agral 90* adjuvant.

† Note: The manufacturer may not support all brand of these products. See the label or contact Viterra for more information.

Check the labels of mix partners for additional crop staging restrictions.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the Momentum label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval between application and rain without loss of control may be up to 8 hours. Contact manufacturer for more information.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze treated fields or cut for hay within 3 days of application.

Preharvest Interval: Leave 60 days between application and harvest.

Re-cropping: Wheat, barley, oats, rye, flax, canola, mustard and peas may be planted the year after application or the field may be fallowed. DO NOT under-seed crops to forage legumes the year after treatment. DO NOT sow ***any other*** crops until the second year after application. Apply manure bedded with straw from treated crops only to the crops listed above.

DO NOT seed to field peas for at least 10 months following treatment. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application delay seeding field peas an additional 12 months (22 months following application). Contact your local Viterra representative or retailer for more information before seeding field peas following drought conditions in the previous year.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool (above 5°C), dry area. If product is frozen, bring to room temperature and agitate before use.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	15	15	15

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy. Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Spray when winds are under 16 km/hr, but not dead calm.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

⚠ Warning – Eye Irritant

For an explanation of the symbols used here see page 11.

Muster Toss-N-Go

Herbicide Group
2 - ethametsulfuron
(Refer to page 38)

Company:

E. I. duPont Canada (PCP#23569)

Formulation:

75% ethametsulfuron-methyl formulated as a water dispersible granule.

Container size - 320 g package (containing 4 x 80 g water soluble bags).

Crops , Rates and Staging:

NOTE: NOT for use on Yellow mustard (Brassica alba).

CROP	RATE (g/acre)	STAGE
Canola	8 to 12	Minimum 2 leaf stage (main stem) to the start of bolting.*
Mustards: Brown & Oriental condiment as well as oilseed quality *(Brassica juncea)*	8	4 leaf stage but prior to bolting.
Ethiopian Mustard *(Brassica carinata)*		
Sunflower	8 to 12	2 to 8 leaf stage (15 to 45 cm)

* NOTE: DO NOT apply prior to this stage as severe crop injury can occur.

Muster applied alone requires the addition of *Agral 90, Agsurf,* or *Citowett* at 0.2 L per 100 L of spray solution.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Weeds, Rates and Staging:

Apply from the 2 to 6 leaf stage. Stinkweed must be sprayed in the 1 to 4 leaf stage

At the 8 g per acre rate (one 320 g package treats 40 acres):

Flixweed *
Green smartweed
Hemp-nettle
Stinkweed **
Wild mustard

The 12 g per acre rate (one 320 g package treats 26.7 acres) controls above weeds plus:

Redroot pigweed **
Stinkweed

* Spring seedlings only.

** Suppression with *Muster* alone but control with *Assure II* plus *Sure-Mix* or a *Poast Ultra* plus *Merge* tank mix where permitted.

Muster applied alone requires the addition of *Agral 90, Agsurf,* or *Citowett* at 0.2 L per 100 L of spray solution. Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 40 L per acre.

Equipment, Nozzles and Pressure: 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE medium*** droplets. Use a 50 mesh or coarser screen and filter system. Sprayer must be equipped with continuous agitation. Maintain the spray boom at 24 inches or less above the crop canopy.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

DO NOT use on crops that are stressed because of drought or flooding. Less than acceptable control will occur in fields where high weed populations exist and where stressful environmental conditions prevail (drought, cold weather). Heavy rainfall soon after application may result in visual crop injury or possible yield reduction. Thin crop stands or application prior to the 2 leaf stage, sandy soils or soils with low organic matter may increase the severity of the injury.

Tank Mixes:

DO NOT mix with substances that contain boron or that release chlorine.

Herbicides:

Canola, Brown and Oriental Mustards (Brassica juncea* only*): *Assure II*. The adjuvant used with *Assure II* is all that is required for this tank mix.

Canola only:

Poast Ultra. The adjuvant used with this product is all that is required for this tank mix.

NOTE: No tank mixes are registered for *Brassica carinata*.

Fertilizers: None registered. DO NOT mix soluble bags with liquid fertilizers.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *Muster* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 4 to 6 hours may reduce control.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze or feed crop to livestock within 60 days of application. DO NOT graze treated sunflowers.

Preharvest: Leave 60 days from application to harvest.

Re-cropping: DO NOT sow wheat, barley, oats or flax within 10 months of application. DO NOT seed canola, lentils, peas, fababeans, tame mustard, alfalfa, canaryseed, dry beans, fescues or red clover within 22 months of application. All other crops must not be sown until a "field bioassay" is performed at 22 months (or more) after application. Growers may experience reduced yields if other crops (such as corn) are grown without following these guidelines.

Aerial Application: DO NOT apply by air.

Storage: May be frozen.

Buffer Zones:

CROP (By ground only*)	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Canola, Sunflower, *Brassica carinata*	4	2	55
Mustard (Condiment and Oilseed types)	3	2	40

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Sprayers used to apply *Muster* should be flushed out immediately after *Muster* is used. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/household ammonia rinse (1L of 3 % ammonia per 100 L water). All nozzles, screens and filters should be removed and cleaned after applying this product.

DO NOT clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Refer to page 14 for additional information.

Hazard Rating:

None indicated.

Odyssey

Herbicide Group
2 - imazamox & imazethapyr
(Refer to page 38)

Company:

BASF Canada (PCP#25111)

Formulation:

35% imazamox and 35% imazethapyr formulated as a dispersible granule.

Container size - 8 x 86.5 g water soluble packs per 40 acre case.

Crops and Staging:

Field peas - 1 to 6 above-ground nodes (1 to 6 true leaves).
CLEARFIELD canola - 2 to 6 leaf stage.
CLEARFIELD oilseed mustard (*Brassica juncea*) - 2 to 6 leaf stage.
CLEARFIELD lentil - 1 to 9 above ground nodes.
Soybean - 1 to 3 true leaves.
Fenugreek (seed and forage production) – 1 to 4 leaf stage.
Alfalfa and bird's-foot trefoil (seed production only, seedling or established).

Temporary crop yellowing may be observed shortly after application in field peas, and CLEARFIELD canola.

Weeds, Rates and Staging:

At 17.3 g per acre (40 acres per case), Odyssey will control:
Grasses - 1 to 4 main stem leaves, until tillers are visible:

Barnyard grass
Green foxtail
Persian darnel
Volunteer cereals (wheat excluding CLEARFIELD varieties, barley, oats)
Wild oat

Broadleaf Weeds - cotyledon to 4 leaf stage unless otherwise indicated:

Chickweed
Cleavers (up to 4 whorls)
Flixweed
Green smartweed
Hemp-nettle*
Kochia** ††
Lamb's-quarters***
Redroot pigweed
Russian thistle†
Shepherd's-purse
Stinkweed
Stork's-bill
Volunteer canola (not CLEARFIELD varieties)
Volunteer tame mustard (not CLEARFIELD oilseed (*B. juncea*) varieties)
Wild buckwheat*
Wild mustard

* Suppression only in field peas and CLEARFIELD lentils.
** Suppression only in field peas and CLEARFIELD canola, not controlled in CLEARFIELD lentils.
*** Suppression only.
† Supression only in CLEARFIELD lentils.

†† *NOTE: Surveys of fields with kochia have found that roughly 90% of these kochia populations were resistant to Group 2 herbicides. Without testing that confirms otherwise, assume that kochia in your field is likely resistant as well and is unlikely to be controlled by* Odyssey *alone.*

Merge adjuvant (sold separately) must be used with *Odyssey*.

CLEARFIELD Canola, CLEARFIELD Lentil, Soybean, Alfalfa (seed production only), and Peas: Use only *Merge* adjuvant at a rate of 0.5 L of *Merge* in 100 L of spray solution.

DO NOT apply *Odyssey* more than once or follow *Odyssey* with any related product in the same year.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 40 L per acre.

Nozzles and Pressure: Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift. Use 50 mesh or coarser filter screens.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

DO NOT spray if temperatures of +5°C are forecast within 3 days of application. Treat crops during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced.

Tank Mixes:

Herbicides:
In CLEARFIELD canola only:
Lontrel (0.17 to 0.23 L/acre).

In field peas, CLEARFIELD canola, CLEARFIELD oilseed mustard and CLEARFIELD lentils only:
Equinox (67 to 101 mL/acre).

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *Odyssey* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Rainfall within 3 hours of application may reduce control.

Grazing: DO NOT graze treated canola or soybean or cut for hay. Field peas may be fed to livestock 30 days after application. DO NOT harvest forage or cut for hay.

Preharvest Interval: DO NOT apply within 60 days of harvesting canola, oilseed *Brassica juncea*, field peas, and lentils. DO NOT apply within 85 days of harvesting soybeans.

Re-cropping: Field peas, lentils, CLEARFIELD canola, canaryseed, oat, barley, field corn, chickpeas and spring wheat (including durum) may be seeded the first full season after application. Flax, canola and sunflower may be seeded the second full season after application. The company recommends that a field bio-assay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above.

NOTE: Breakdown of Odyssey *may be slowed or delayed by environmental conditions such as drought, excessive cold and/or acid soils (pH less than 6.5) resulting in an increased risk of injury to rotational crops. The most tolerant crops are CLEARFIELD canola and legume crops, then cereals. Contact manufacturer for additional information on re-cropping interval (1-877-371-2273).*

Aerial Application: DO NOT apply by air.

Storage: DO NOT freeze. Store in a cool, dry place above 5°C.

Buffer Zones: Avoid spraying in situations where drift may occur. Leave a buffer zone of at least 14 m between the outside boundary of the sprayed area and sensitive areas such as shelterbelts, hedgerows, wetlands, woodlots, vegetated ditch banks, ponds, streams, and sloughs.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

⚠Warning – Eye and Skin Irritant

⚠Warning – Contains allergen "sulfites"

For an explanation of the symbols used here see page 11.

Odyssey DLX

Herbicide Group

1 - tepraloxydim
2 - imazamox & imazethapyr
(Refer to page 38)

This product is a prepackaged tank mix of *Equinox* (page 147) and *Odyssey* (page 228). Information listed is restricted to Crop, Weeds, Rates and other important details. Refer to the component products listed above for detailed information on restrictions and the effects of growing conditions.

Company:

BASF Canada

Formulation:

The *Odyssey DLX* package contains three components:

***Odyssey* (PCP#25111):** 35% imazamox and 35% imazethapyr formulated as a dispersible granule.
Container size - 8 x 86.5 g water soluble bags

***Equinox* (PCP# 27603):** 200 g/L tepraloxydim as an emulsifiable concentrate.
Container size - 2.67 L jug.

***Merge* adjuvant (PCP#24860):**
Container size - 8.1 L jug.

Crops and Staging:

Field peas: 1 to 6 above ground nodes (1 to 6 true leaves).

CLEARFIELD lentil: 1 to 9 above ground nodes.
Temporary crop yellowing may be observed shortly after application in field peas and CLEARFIELD lentils.

CLEARFIELD canola: 2 to 6 leaf stage.

CLEARFIELD oilseed mustard (*Brassica juncea*): 2 to 6 leaf stage.

Weeds and Staging:

Broadleaf and grass weeds controlled at the stages found on the *Odyssey* page plus grasses controlled by *Equinox* at the annual grass rate up to the six leaf stage.

Plus:

Japanese brome (spring seedlings*)

* NOTE: While the label does not indicate the upper limit on what constitutes a seedling, BASF recommends a maximum of 4 leaves at application.

Rate:

Odyssey: 17.4 g per acre.

Equinox: 67 mL per acre.

One case of *Odyssey DLX* will treat 40 acres.

***Merge* adjuvant:** *Merge* must be used with *Odyssey DLX* at a rate of 0.5 L of *Merge* in 100 L of spray solution.

Add components in the order listed above.

Odyssey DLX with any related product (*Odyssey, Equinox, Solo, Viper* or imazethapyr) in the same year.

Refer to the product label for complete mixing instructions for this product. A general guide to mixing can be found on page 13.

Restrictions and Application Information:

See the *Equinox* and *Odyssey* components on restrictions application details and handling. Use the most limiting restrictions across all components for the mix.

NOTE: Pay particular attention to the recropping statements on the Odyssey page.

Optica Trio

Herbicide Group

4 - MCPA, mecoprop & dichlorprop

(Refer to page 38)

Company:

United Agri Products (PCP#29662)

Formulation:

160 g/L MCPA + 130 g/L mecoprop-p + 310 g/L dichlorprop-p formulated as a solution

Container size - 10 L.

Crops and Staging:

CROP	STAGE
Barley, Oats, Spring wheat (including durum)	2 to 5 leaf
Winter wheat	Spring application only; up to 12 inches (30 cm) high (top leaf extended)

Weeds, Rates and Staging:

Weeds controlled at the 2 to 3 leaf stage unless otherwise indicated.

Apply at 0.61 L per acre to control:

Lamb's-quarters
Stinkweed
Volunteer canola
Wild mustard

Apply at 1.0 L per acre to control the weeds listed above plus:

Canada thistle*
Chickweed (Common)
Cleavers (1 to 2 whorls)
Kochia
Lady's-thumb (suppression)
Ragweed (Common)
Redroot pigweed
Wild buckwheat

* Top Growth Control only

Application Information:

Water Volume: Minimum 20 L per acre.

Nozzles and Pressure: 30 to 43 psi (200 to 300 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE medium*** droplets.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Less than satisfactory control may result if weeds are not actively growing such as under conditions that are extremes of hot or cold, dry or wet weather prior to spraying.

Tank Mixes:

Herbicides:

Spring wheat (including durum):
*clodinafop 240EC** (93 mL/acre) plus supplied adjuvant.

Spring wheat (NOT including durum):
Everest 70WDG† (up to 17.4 g/acre) plus non-ionic surfactant**

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

* *Horizon 240EC* and *Signal* only.

** *Agral 90, AgSurf, LI700, Super Spreader, Surf 92.*

† Reduction in wild oat control may be observed with this tank mixture at high populations

Note: The above mixes are those listed on the *Optica Trio* label only. To check for other possible registered mixes see the blue chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Re-entry: DO NOT enter treated fields for 12 hours.

Grazing: DO NOT feed treated crops to milking animals or harvest for forage within 7 days of application. Meat animals grazing treated crops must be removed 3 day prior to slaughter.

Preharvest: No pre-harvest interval indicated on label when *Optica Trio* is used alone.

Re-cropping: No information provided on label. Contact manufacturer for information.

Aerial Application: DO NOT apply by air.

Storage: Keep from freezing.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	2

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Caution – Poison

Danger - Corrosive to eyes

For an explanation of the symbols used here see page 11.

Option 35 DF/Option 2.25 OD

For use in Manitoba only.

Herbicide Group
2 - foramsulfuron
(Refer to page 38)

Company:

Bayer CropScience

Formulations:

Option 35 DF **(PCP#27425):** 35% foramsulfuron formulated as a dispersible granule.
Container size - 8 x 100 g packets per case.

Option 2.25 OD **(PCP#27424):** 22.5 g/L foramsulfuron formulated as an oil dispersion.
Container size - 6.3 L jug.

Crops and Staging:

Field corn at the 1 to 8 leaf stage or 5 to 6 visible collars

Weeds and Staging:

Annual Grasses:

WEED	LEAF STAGE
Barnyard grass	1 to 6 (to early tillering)
Foxtail (green and yellow)	2 to 5 (to early tillering)
Proso millet	2 to 5 (to early tillering)
Witchgrass	2 to 4

Broadleaf Weeds:

WEED	LEAF STAGE
Chickweed, common	4 to 6
Lamb's-quarters	4 to 8
Mustard, wild	5 to 7
Mustard, wormseed	5 to 9
Nightshade, eastern black	1 to 5
Pigweed, redroot	1 to 7
Ragweed, common*	2 to 4

* Suppression only.

Rates:

Option 2.25 OD: 0.63 L per acre (10 acres per jug) plus 28% UAN (liquid 28-0-0) at 1.0 L per acre.

Option 35 DF: 40.5 g per acre (20 acres per case) plus 28% UAN (liquid 28-0-0) at 1.0 L per acre plus *Hasten* Adjuvant at 0.71 L per acre.

NOTE: *Option 35 DF* and *Option 2.25 OD* must be tank mixed with ***Banvel II*** at 121 mL per acre.

Add *Option 35 DF* or *Option 2.25 OD* to a half full tank, followed by *Banvel II*, then 28% UAN then *Hasten* adjuvant (for use with Option 35 DF only).

Application Information:

Water Volume:
Option 35 DF: 89 L per acre.
Option 2.25 OD: 60 L per acre

Nozzles and Pressure: Use 25 to 40 psi (175 to 275 kPa) when using conventional 80° or 110° flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE medium*** droplets. Use with 50 mesh or larger screens.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Under optimum conditions weed growth ceases within 1 to 3 days and yellowing of the growing point occurs in 5 to 10 days. Warm moist conditions provide for the best activity. Activity may be reduced or delayed if applied under cool and/or dry conditions or in the presence of heavy dew, fog, mist or rain or if weeds are dust covered. If the crop or weeds are under stress due to environmental conditions, delay application until the both crop and weeds have resumed active growth.

Tank Mixes:

Herbicides:
Banvel II (121 mL/acre)*.

Fertilizers: DO NOT use any fertilizers or additives other than 28% UAN (1 L/acre), recommended*.

Insecticides: Avoid application to corn that has been treated with organophosphorous insecticides.

Fungicides: None registered.

* *Option 35 DF* must be applied to corn in Manitoba as a tank-mixture with *Banvel II*, 28% UAN and *Hasten* adjuvant. *Option 2.25OD* must be applied to corn in Manitoba as a tank-mixture with *Banvel II* and 28% UAN. See 'Rates' section above.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13

Restrictions:

Rainfall: Within 6 hours may reduce control.

Re-entry: DO NOT enter treated fields until residues have dried.

Grazing: DO NOT graze treated corn crops or cut for forage within 45 days of application.

Preharvest Interval: Leave 70 days between application and harvest of grain.

Re-cropping: The following crops may be grown the season following application: alfalfa, barley, beans (dry common), canola, clover (red), corn (field and sweet), oats, peas, potatoes, soybeans, timothy, spring wheat. Winter wheat may be seeded 4 months after application.

Aerial Application: DO NOT apply by air.

Storage: Keep dry.

Buffer Zones:

Application method (ground only*)	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Option 35 DF	1	1	3
Option 2.25 OD	1	1	3

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones for ground applications can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Option residues in the spray tank can cause severe injury to sensitive crops at very low concentrations. Sprayers should be cleaned out immediately before using another product. Follow the steps below:

1. Drain the tank and thoroughly rinse the spray tank, boom and hoses with clean water. Pay particular attention to flushing out any visible deposits.
2. Fill the tank with ammonia/water solution (1 L of 3% household ammonia per 100L of water) and flush the hoses, boom and nozzles with the solution. Circulate for at least 15 minutes. Flush hoses, boom and nozzles once more, then drain the tank.
3. Remove all nozzles, screens and filters and clean in a separate container using an ammonia/water solution as above.
4. Repeat #2.
5. Rinse tank, boom and hoses with clean water. And wash any residue from the outside of the tank.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk. For additional information on tank cleaning see page 14.

Hazard Rating:

Option 35 DF:

◇Warning – Skin and Eye Irritant.
Potential Skin Sensitizer

Option 2.25 OD:

▽ Caution – Eye Irritant

◇Warning – Skin Irritant
Potential Skin Sensitizer

For an explanation of the symbols used here see page 11.

Overdrive

Herbicide Group
4 - dicamba
19 - diflufenzopyr
(Refer to page 38)

Company:

Engage Agro on behalf of BASF Canada (PCP#30065).

Formulation:

20% diflufenzopyr and 50% dicamba sodium salts formulated as water dispursible granules.

Container size - 4 x 3.4 kg.

Crops and Staging:

Established permanent grass pasture, non-cropland sites and rangeland. DO NOT apply *Overdrive* on annual crops or newly seeded grasses.

Weeds and Staging:

Biennial wormwood
Canada thistle*
Dandelion**
Lady's-thumb
Lamb's-quarters
Leafy spurge**
Ragweed (common)
Redroot pigweed
Sweet clover*
Tall water-hemp
Velvetleaf
Vetch*
Wild buckwheat

* Top growth control

**Top growth suppression

Rates:

115 g per acre. (One package treats 118 acres)

Add a nonionic surfactant at 0.25 L per 100L of spray solution plus ammonium nitrate (UAN 28%) at 1.25L per 100L of spray solution must also be added. Use of an anti-foam agent is suggested.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: Minimum 89 L per acre. Use higher water volumes when treating dense or tall vegetation.

Nozzles and Pressure: Maximum 20 psi (150 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of application equipment and pressure that is designed to deliver an even coverage of ***ASABE coarse*** droplets that are less prone to drift. Non-target broadleaf plants are very sensitive to *Overdrive* drift. Avoid conditions that are conducive to drift. (See page 12 for drift control suggestions).

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

DO NOT spray if temperatures are expected to exceed 27ºC. DO NOT spray in high humidity or fog. DO NOT spray if wind velocity exceeds 8 km/h. Established grasses growing under stress conditions can exhibit various injury symptoms that may be more pronounced if herbicides are applied.

Tank Mixes:

None registered.

Restrictions:

Rainfall: Heavy rain within 4 hours of application may reduce control.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT permit lactating dairy animals to graze fields within 7 days after application. DO NOT harvest forage or cut hay within 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool, dry place.

Buffer Zones:
Hand-held or backpack sprayer and spot treatment DO NOT require a buffer zone from sensitive habitat, but efforts should be made to minimize exposure to sensitive plants and open water or wetlands.

Application method	Buffer Zones (metres†) Required for the Protection of:	
	Freshwater habitat	Terrestrial habitat
Field sprayer*	15	10

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Caution – Poison

Caution – Eye Irritant
Potential Skin Sensitizer

Warning – Contains the allergen sulfites

For an explanation of the symbols used here see page 11.

Pinnacle SG

Herbicide Group
2 - thifensulfuron
(Refer to page 38)

Company:

E. I. duPont Canada (PCP#22002)

Formulation:

***Pinnacle SG* (PCP#29349):** 50% thifensulfuron methyl as a water soluble granule.
Container size - 8 x 12 g water soluble pouches.

Crops and Staging:

Soybeans - First fully expanded trifoliate leaf to flower initiation.

Weeds, Rates and Staging:

Apply up to 4 inches (10 cm) tall or wide:

***Pinnacle SG* at 3.3 g per acre will control:**

Lady's-thumb
Redroot pigweed
Wild Mustard

***Pinnacle SG* at 4.8 g per acre will control the weeds above plus:**

Lamb's-quarters
Velvetleaf *

(one container treats 28.5 to 20 acres).

Requires the addition of a non-ionic surfactant such as *Agral 90, Agsurf,* or *Citowett* at 1 L per 1000 L of spray solution. Oil surfactant blends such as *Assist,* or *Sure-Mix* may be used as adjuvants (check label for use rates).

* The addition of 28-0-0 liquid fertilizer at 4 L per 100 L of spray solution or 2.4 kg of 46-0-0 dry urea fertilizer may improve control of velvetleaf. Refer to the product label for complete mixing instructions.

A general guide to mixing can be found on page 14.

Application Information:

Water Volume: Minimum of 45 L per acre.

Nozzles and Pressure: Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE medium*** droplets.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Pinnacle applied to crops that have been under stress before application may result in crop injury. Stress conditions within 3 days after application may also result in crop injury.

Weeds under stress conditions at the time of application may not be adequately controlled.

Stress conditions are severe weather conditions, frost, low fertility, drought, water-saturated soils, and disease or insect damage.

Injury symptoms can be crop discoloration (yellowing, purpling or reddening), or stunting.

Tank Mixes:

Herbicides:

Assure II (0.2 L/acre) plus *Sure-Mix**.
Basagran (0.71 or 0.91 L/acre) plus *Assist* adjuvant*.
Basagran Forté (0.71 or 0.91 L/acre)*.
Assure II (0.25 L/acre) plus *Basagran Forté* (0.71 or 0.91 L/acre) plus *Sure-Mix* adjuvant*.

* Refer to appropriate labels for *Pinnacle* and adjuvant rates of application.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *Pinnacle* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: If rainfall occurs soon after application control may be reduced. Several hours of dry weather are needed after application to allow uptake by the plants.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze or cut for feed.

Preharvest: Leave 60 days from application to harvest.

Re-cropping Interval: DO NOT plant any crop other than wheat or barley for 30 days after application.

Aerial Application: DO NOT apply by air.

Storage: Store in closed original container in a dry area away from food or feed.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	0	15

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy. Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Pinnacle can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray *Pinnacle* should be flushed out immediately after use. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/household ammonia rinse (1 L of 3 percent ammonia per 100 L of water). All nozzles, screens and filters should be removed and clean separately during the cleaning process. Do a clean water rinse of the tank, booms, hoses and nozzles to complete the procedure.

Refer to page 14 for additional information.

Hazard Rating:

⚠ Warning: Contains the allergen milk.

For an explanation of the symbols used here see page 11.

Poast Ultra

Herbicide Group
1 - sethoxydim
(Refer to page 38)

Company:

BASF Canada (PCP#24835)

Formulation:

450 g/L sethoxydim formulated as an emulsifiable concentrate.

Container size - 2 x 7.7 L jug of *Poast Ultra*.

Crops, Rates and Staging:

Crops are tolerant at all growth stages. However, the Preharvest interval outlined in the "Restrictions:" section must be followed to avoid unacceptable residues of sethoxydim in harvested crops.

To a maximum rate of 0.19 L per acre:
Chickpea

To a maximum rate of 0.23 L per acre:
Tame buckwheat

To a maximum rate of 0.26 L per acre:

Alsike clover**
Caraway
Cicer milkvetch**
Coriander
Dill
Safflower
Sainfoin**
Solin (low linolenic flax)
Sweet clover**

To a maximum rate of 0.45 L per acre:

Alfalfa
Alsike clover*
Canola
Chickling vetch
Cicer milkvetch*
Creeping red fescue (for seed only)
Dry beans (adzuki, kidney, lima, mung, pinto, white)
Dry field peas
Fababeans
Lentil
Lupin
Mustard
Potatoes
Sainfoin*
Flax (not including Solin)
Shelterbelts
Soybeans
Sunflower
Sweet clover*

* Established stands
** Seedling stands

Weeds, Rates and Staging:

Optimum yield response occurs when weeds are controlled early.

WEEDS AND STAGES	STAGING	RATE (L/ACRE)	ACRES TREATED PER 7.7 L CONTAINER
Green or yellow foxtail, barnyard grass, volunteer corn, Persian darnel, proso millet, witchgrass, large crabgrass	1 to 6 leaf	0.13	60
Wild oats, volunteer wheat, oats and barley	1 to 6 leaf stage except for low rate (See footnote*)	0.13* or 0.19	60 or 40
Quackgrass suppression	1 to 3 leaf stage	0.19	40
Quackgrass (season long control)	1 to 3 leaf stage	0.45	17
Foxtail barley suppression	prior to tillering	0.45	17

* Use the low rate in canola, flax and peas only when

- wild oat, volunteer wheat and volunteer barley are from 1 to 4 leaves (best results prior to tillering)
- under ideal growing conditions (adequate moisture, good fertility and moderate temperatures (15 to 28°C). DO NOT apply under stress conditions.
- with water volumes between 20 to 40 L per acre.

***Merge Adjuvant* (sold separately):** Must always be used with *Poast Ultra*. When *Poast Ultra* is applied alone use *Merge* at 0.5 L to 1.0 L per 100 L of total spray solution. When applying to quackgrass and/or foxtail barley use *Merge* at 1.0 L per 100 L of spray solution. See the tank mix section for *Merge* rates for tank mixing. *Merge* should be added at rates of 0.10 to 0.20 L per acre when applied by air.

Application Information:

Water Volume:
Ground: 20 to 40 L per acre
40 L to 81 L per acre if crop or weed growth is dense, and when spraying quackgrass.
Aerial: 10 to 20 L per acre

Nozzles and Pressure: Use 40 to 45 psi (275 to 300 kPa) with conventional 80° or 110° flat fan nozzles tilted forward at an angle of 45°. Low drift nozzles may require higher pressures for proper performance. Contact the herbicide manufacturer regarding the suitability of low drift nozzles for use with this product. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Most effective control is achieved when grasses are actively growing. Weeds stressed by drought, flooding, hot or prolonged cool temperatures (<15°C) and poor fertility are more difficult to control. Use the higher of the recommended rates for grasses stressed for less than 20 days. DO NOT apply to grasses stressed more than 20 days because of lack of moisture. Control may be reduced if temperatures are below 15°C. Subsequent tillering may occur under stress conditions or if fertility is low.

Tank Mixes:

Herbicides: The following tank mixes can be applied with 0.13 to 0.19 L/acre of *Poast Ultra.*

***Merge* Adjuvant (sold separately):** Use at 0.75 to 1.0 L of *Merge* per 100 L of mixed spray solution for most mixes except when mixing with *Pursuit* use 1.0 L per 100 L of solution.

In Flax:

Buctril M (0.4 L/acre)(including Solin).
Logic M (0.5 L/acre)(including Solin).
Lontrel 360 (0.23 to 0.34 L/acre).
Lontrel 360 (0.23 to 0.34 L/acre) + *MCPA* Ester (0.34 to 0.45 L/acre - 500 g/L formulations).
MCPA Ester (up to 0.45 L/acre - 500 g/L formulations)

The above tank mixes may reduce grass control, especially under adverse weather conditions.

In Canola:

Lontrel (0.17 to 0.34 L/acre).
Muster (8 to 12 g/acre).
Lontrel (0.17 L/acre) + *Muster* (8 g/acre) + *Merge* (0.4 L/acre).

In Liberty Link canola only:

Poast Ultra (0.90 L/acre) + *Liberty* (1.08 L/acre)

In Field peas:

Poast Ultra (0.19 L/acre) plus *Merge* (0.4 L/acre) may be tank mixed with:

***Pursuit* (40 mL/acre) to control:**

- Chickweed
- Cleavers
- Hemp-nettle (peas only)
- Redroot pigweed (light infestations only)
- Smartweed
- Stinkweed
- Volunteer canola (non-CLEARFIELD varieties)
- Wild buckwheat (light infestations only)
- Wild mustard

The company does not provide guidelines for weed densities under light infestations. When in doubt, use the higher rate below or contact the manufacturer.

Pursuit (85 mL/acre) for all weeds on the *Pursuit* label.

Check label directions for mixing order and additional timing restrictions for broadleaf partners.

Allow 4 days between application of *Poast Ultra* and application of herbicides other than those registered for tank mixing. Allow 5 days between application of *Sencor* and *Poast Ultra.* Allow 14 days for regrowth when applied in sequence with a grass control herbicide.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *Poast Ultra* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 1 hour of application may reduce control.

Re-Entry: DO NOT enter treated field for 12 hours.

Grazing: DO NOT graze the treated crop or cut for feed prior to crop maturity. Forage legumes may be cut after the specified Preharvest interval.

PREHARVEST INTERVAL (DAYS)	CROPS
30	Forage legumes (excluding alfalfa)
60	Dry peas, flax
65	Lentil, chickpea
70	Canola, chickling vetch, alfalfa
76	Mustard
80	Potato, dry bean, soybean, fababean, lupin
85	Buckwheat
86	Solin
90	Safflower
105	Sunflower

Re-cropping: DO NOT plant cereals or grass within 14 days of application.

Aerial Application: May be applied by air.

Storage: May be frozen.

Buffer Zones:

Application method	Crops	Buffer Zones (metres†) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
Ground*	All	1	0	2
Fixed wing airplane	Food or feed crops	1	0	7
	Shelter-belts	5	0	150
Helicopter	Food or feed crops	1	0	60
	Shelter-belts	1	0	85

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance from downwind edge of spray boom and non-target area.

Tank Cleaning:

Refer to page 15. Empty and clean spray tank if an oil film accumulates.

Hazard Rating:

Caution – Poison

Caution – Eye and Skin Irritant

For an explanation of the symbols used here see page 11.

Pre-Pare

Herbicide Group
2 - flucarbazone
(Refer to page 38)

Company:

Arysta LifeScience Canada (PCP#29500)

Formulation:

66% flucarbazone formulated as a water dispersible granule.

Container size - 522 g or bulk 1400 g.

Crops and Staging:

Spring wheat (NOT including durum):
Apply to the soil surface from one week before seeding until crop emergence.

Weeds, Rates and Staging:

DO NOT apply more than 17.4 g per acre of products containing *flucarbazone* per growing season

APPLICATION TIMING	RATE (g per acre)	WEEDS***
Pre-plant or pre-emergence surface	8.7	Volunteer canola***, Wild oats†
Pre-plant or pre-emergence surface* followed by post-emergence *Everest***	8.7 + 8.7	Green foxtail Wild oats Volunteer canola***

* Crop injury may occur, but yield should be unaffected

** See flucarbazone page for details.

*** Will not control imidazolinone tolerant (CLEARFIELD) canola volunteers or Group 2 resistant weed biotypes.

† Suppression only.

Application Information:

Water Volume: 40 L per acre.
Nozzles and Pressure: Use 30 to 50 psi (200 to 345 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Crop tolerance and weed control may be reduced if applications are made to plants growing under stress. Stress includes saturated or water-logged soil, drought, extreme temperatures, low fertility or visible disease symptoms at application. Adopting practices to increase crop vigor will improve crop tolerance.

Tank Mixes:

Herbicides:
Glyphosate IPA or K+ salts

Fertilizers: None.

Insecticides: None

Note: The above mixes are those listed on the *Pre-Pare* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No rainfastness concerns with *Pre-Pare,* but observe restrictions for glyphosate if tank-mixed.

Grazing: DO NOT graze treated fields. Mature grain or straw may be fed to livestock.

Preharvest: Leave at least 80 days from application to harvest.

Re-cropping Interval: The following crops may be planted 11 months after an application of *Pre-Pare.*

Soil Zones and Rotational Crops			
Grey-Wooded	**Black**	**Dark Brown**	**Brown**
Spring Wheat Barley Canola (all varieties) Field Peas*	Wheat (Spring & durum) Barley Canola (all varieties) Field Peas* Flax Field Bean	Wheat (Spring & durum) Barley Canola (all varieties) Field Peas* Flax	Spring Wheat

* Field peas may be grown the year following *Pre-Pare* application in fields where precipitation has been equal to or above the 10 year average during the growing season, and where organic matter content is above 4%, and pH is below 7.5. The company suggests a minimum of 100 mm (4 inches) of rain is needed in the 60 days following application for adequate breakdown to take place.

NOTE: Other rotational crops may also be affected if rainfall is less than the 10 year average for the area. Soils in the grey wooded, black and dark brown soil zones with a combination of low organic matter (less than 2%), light textured soils or high pH (greater than 7.5) (i.e. eroded knolls, sandy soils) may result in delayed growth and development in rotational crops. Do not plant crops other than those listed above in the year following application of Pre-Pare *on wheat.*

Aerial Application: DO NOT apply by air.

Storage: Store in closed original container in a cool, dry area away from fertilizers, food or feed. Pre-pare herbicide is not affected by storage at freezing temperatures.

Buffer Zones: Leave at least 20 m from the downwind edge of the spray swath to sensitive upland plants like shelterbelts and woodlots and at least 35 m to water sources or wetland habitats. Avoid drift onto sensitive crops like canola and tame oat. DO NOT mix or load within 10 m of water sources or wetland habitats.

Tank Cleaning:

Pre-pare residues in the spray tank can cause severe injury to sensitive crops at very low concentrations. Sprayers should be cleaned out immediately before using another product. Follow the steps below:

1. Drain the tank and thoroughly rinse the spray tank, boom and hoses with clean water. Pay particular attention to flushing out any visible deposits.
2. Fill the tank with ammonia/water solution (1 L of 3% household ammonia per 100L of water) and flush the hoses, boom and nozzles with the solution. Circulate for at least 15 minutes. Flush hoses, boom and nozzles once more, then drain the tank.
3. Remove all nozzles, screens and filters and clean in a separate container using an ammonia/water solution as above.
4. Repeat #2.
5. Rinse tank, boom and hoses with clean water. And wash any residue from the outside of the tank.

DO NOT clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk. For additional information on tank cleaning

Hazard Rating:

⚠ Warning: Contains the allergen milk.

For an explanation of the symbols used here see page 11.

Pre-Pare + glyphosate

Herbicide Group
2 - flucarbazone
9 - glyphosate
(Refer to page 38)

This product is a prepackaged tank mix of *Pre-Pare* (page 239) and *glyphosate* (page 174). Information listed is restricted to Crop, Weeds and Rates. For other detailed restrictions and other general information on the component products see the product pages listed above.

Company:

Syngenta Canada (*Pace*)*

Viterra (*Pre-Pare Complete*)

** NOTE: This formulation is no longer manufactured, but some supplies may still remain in the distribution system. This product may be removed from future editions of this publication.*

Formulations:

Pace: *Pre-Pare* (PCP#29500) + *Traxion* (PCP#29201)

Pre-Pare Complete: *Pre-Pare* (PCP#29500) + *Startup* (PCP#29498)

Container size -

Pre-Pare Complete: 1 x 522 g bottle of *Pre-Pare*; 2 x 10 L jugs of *StartUp* glyphosate (treats 60 acres)

Pace: 1400 g of ***Pre-Pare;*** 58 L of *Traxion* glyphosate (treats 160 acres)

Crops and Staging:

For application prior to the crops registered for *Pre-Pare*.

Weeds, Rates and Staging:

Weeds controlled prior to seeding by *glyphosate* at 180 g ae per acre (0.5 L per acre of a 360 g per L formulation)

-plus-

Weeds controlled *by Pre-Pare* at 8.7 g per acre.

DO NOT apply more than 17.4 g per acre of products containing flucarbazone per growing season.

See component products for more information on restrictions application details and handling. Use the most limiting restrictions of each component.

PrePass XC

Herbicide Group
2 - florasulam
9 - glyphosate
(Refer to page 38)

Company:

Dow AgroSciences

Formulation:

PrePass XC A **(PCP#29651):** 50 g/L florasulam formulated as a suspension concentrate.
PrePass XC B **(PCP#29652):** 480 g/L glyphosate DMA salt formulated as a solution.
Container sizes:
PrePass XC A - 1.6 L (40 acre); 4 x 12 L (1200 acre).
PrePass XC B - 2 x 10 L (40 acre); 4 x 112.5L or 450 L (1200 acre).

Crops and Staging:

PrePass can be applied either in the fall or in the spring prior to seeding spring wheat (including durum), barley or oats or as an initial treatment in summerfallow.

Weeds and Staging:

Grasses at the 2 to 4 leaf stage:

Downy brome
Green foxtail
Persian darnel
Volunteer barley
Volunteer wheat
Wild oat

Broadleaf weeds controlled at the 2 to 4 leaf stage:

Canada fleabane**
Common chickweed
Cleavers
Dandelion (up to 30 cm across)
Flixweed
Hemp-nettle
Kochia
Lamb's-quarters
Narrow-leaved hawk's-beard**
Ragweed (common)**
Redroot pigweed
Russian thistle
Scentless chamomile
Shepherd's-purse
Stinkweed
Smartweed (including Lady's-thumb)
Volunteer canola (all varieties)
Volunteer flax
Wild buckwheat*
Wild mustard

Broadleaf weeds suppressed:

Annual sow-thistle
Perennial sow-thistle***

* Up to 5 leaf stage.
** Up to 8 cm in height.
*** Earlier applications provide better results.

Rate:

PrePass XC A: 40 mL per acre.

-plus-

PrePass XC B: 375 mL per acre.

(See "Formulations:" section for package rates.)

Refer to the product label for complete mixing instructions for this product. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 20 to 40 L per acre.

Nozzles and Pressure: Use 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver thorough, even coverage with *ASABE coarse* droplets.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

PrePass XC A: Warm, moist growing conditions promote active weed growth and enhance activity. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur.

PrePass XC B: Best results are achieved when temperatures are near 20°C and when weeds are actively growing. Frost that kills more than 40% of above ground tissue will reduce control. Heavy dust layer on leaves will also reduce control.

Tank Mixes:

None registered.

Dow AgroSciences supports the following mixes that are not on the *Pre-Pass* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides: *2,4-D ester, MCPA ester, Vantage Plus Max II*

Restrictions:

Rainfall: Heavy rainfall immediately after application may wash the chemical off the foliage. DO NOT apply if rainfall is forecast for the time of application. Contact manufacturer for more information.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze treated crop or cut for feed within 7 days of application.

Re-cropping: Spring wheat (including durum), barley and oat, may be seeded, or the field may be fallowed, after applications made in the spring prior to seeding, or the previous year after August 1. Barley, canola, field peas, oat and wheat, may be grown following applications made prior to August 1 of the previous season.

Aerial Application: DO NOT apply by air.

Storage: Store in dry, heated area. DO NOT freeze.

Buffer Zones:

Application method	Buffer Zones (metres[†]) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	5	5	30

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

[†] Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Caution – Poison

Caution – Irritant, may cause eye irritation.

For an explanation of the symbols used here see page 11.

Prestige XC

Herbicide Group

4 - fluroxypyr, clopyralid & MCPA
(Refer to page 38)

Company:

Dow AgroSciences

Formulation:

The *Prestige XC* package has 2 components:

***Prestige XC A* (PCP# 29462):** 333 g a.e./L fluroxypyr
Container size - 3.3 L or in bulk package 4 x (2 x 9.9 L)

***Prestige XC B* (PCP# 29465):** 50 g/L clopyralid and 280 g/L *MCPA ester.*
Container size - 2 x 8.0 L or bulk package 4 x 96 liter.

All of the above components are formulated as an emulsifiable concentrates.

Crops and Staging:

Cereals:

Spring wheat (including durum), winter wheat (apply in the spring), barley and canaryseed*

Forage Grasses* grown for seed production:
Seedling and established stands - 4 leaf until the emergence of the flag leaf.

- Bromegrass (meadow, smooth)
- Fescue (creeping red, tall)
- Timothy
- Wheatgrass (crested, intermediate)

* *NOTE: Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance.* ***Users of this product on forage grasses and canary seed do so at their own risk.***

Weeds, Rates and Staging:

Unless otherwise stated, the following weeds will be controlled if sprayed in the 2 to 4 leaf stage.

The 27 acre per case rate (*Prestige XC A* at 0.13 L per acre; *Prestige XC B* at 0.6 L per acre) controls:

- Canada thistle (light infestations)
- Cleavers (1-8 whorls)
- Flixweed***
- Kochia
- Lamb's-quarters
- Shepherd's-purse
- Stinkweed
- Stork's-bill (1-8 leaf) **
- Volunteer flax (1-12 cm)
- Volunteer sunflower
- Wild buckwheat (1-8 leaf)
- Wild mustard

The 480 acre per bulk container rate of *Prestige XC* or the 20 acre per case rate (*Prestige XC A* at 0.17 L per acre; *Prestige XC B* at 0.8 L per acre) controls the above weeds plus:

- Annual sow-thistle
- Canada thistle* (moderate to heavy infestations)
- Chickweed**
- Common groundsel
- Dandelion***
- Hemp-nettle (2-6 leaf stage)**
- Perennial sow-thistle*
- Redroot pigweed
- Round leaved mallow (1 to 6 leaf)
- Russian pigweed
- Scentless chamomile
- Smartweed
- Tartary buckwheat
- Volunteer canola

* Spray when 4 to 6 inches (10 to 15 cm) high. Season long control, with some regrowth in the fall.
** Suppression only.
*** Spring rosettes only.

Application Information:

Water Volume:
Ground: 20-40 L per acre.
Aerial: 12-20 L per acre. Consult label for buffer zones.

Nozzles and Pressure: Maximum 30 to 40 psi (200 to 275 kPa) with conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver proper coverage with ***ASABE coarse*** droplets. Tilt nozzles forward at a 45° angle to improve coverage of vertical targets.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

The activity of the *Prestige* is influenced by weather conditions. The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after application may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions (drought or heat stress) or if heavy infestations exist.

Tank Mixes:

Herbicides:

In spring wheat (including durum) and barley:

Liquid Achieve (0.2 L/acre) plus *Turbocharge* adjuvant.
Assert (0.53 to 0.65 L/acre) plus acidifier.
Puma^{120} *Super* (0.16 to 0.31 L/acre).

In spring wheat (including durum):

Horizon 240EC (93 mL/acre) plus *Score* adjuvant.
Everest 70WDG (17.4 g/acre) plus recommended surfactant.

Fertilizers: None registered.

Insecticides: None registered.

Note: Insecticides: None registered.

Note: The above mixes are those listed on the *Prestige XC* label only. For other possible registered mixes see the blue fold out chart inside back cover.

Dow AgroSciences also supports the following mixes that are not on the *Prestige XC* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides: *Assert plus ½ rate Puma*^{120} *Super, Avenge*

Adding ingredients in the correct order is critical for optimum performance.

Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 6 hours of post-emergent application may result in reduced weed control.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT cut or graze treated fields of wheat, barley or canaryseed for 7 days after application. DO NOT cut treated forage grass fields for hay or forage. DO NOT graze treated forage grass fields.

Preharvest Interval: DO NOT harvest crop within 60 days of application.

Re-cropping: Wheat, oats, barley, rye (not under-seeded to forage legumes, clover or alfalfa), flax, canola, field peas* and mustard may be seeded the season following application.

NOTE: DO NOT seed to field peas for at least 10 months following treatment. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application delay seeding field peas an additional 12 months (22 months following application). Contact your local Dow AgroSciences representative or retailer for more information before seeding field peas following drought conditions in the previous year.

DO NOT seed legume forages or crops other than those listed above until the second season following application.

Aerial Application: May be applied by air.

Storage: Store product in original containers in a secure, dry, heated area. If the product is frozen, bring to room temperature and agitate before use.

Buffer Zones:

Application method	Buffer Zones (metres[†]) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	5	5	30
Fixed Wing aircraft	4	0	60
Helicopter	1	0	50

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones for ground applications can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

[†] Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Danger – Poison.

⚠ Warning - Eye and Skin Irritant
Potential Skin Sensitizer

For an explanation of the symbols used here see page 11.

Primextra II Magnum

Herbicide Group
15 - metolachlor
5 - atrazine
(Refer to page 38)

Company:

Syngenta Canada (PCP#25730)

Formulation:

400 g/L of s-metolachlor + 320 g/L of atrazine formulated as a liquid.

Container size - 14 L.

Crops and Staging:

Corn - Preplant incorporated (PPI) or Pre-emergence if irrigated within 10 days of application.

Weeds and Staging:

Apply prior to the emergence of weeds. Weeds that have emerged prior to application will not be controlled.

American nightshade
Barnyard grass
Buckwheat
Eastern black nightshade
Foxtail (green, yellow)
Lamb's-quarters
Prostrate pigweed
Purslane
Ragweed
Redroot pigweed
Smartweed (lady's-thumb)
Wild mustard
Witchgrass
Yellow nutsedge*

* Herbicide must be incorporated for best control.

Rates:

WEED POPULATIONS	RATE (L/ACRE)	ACRES TREATED PER 14 L CONTAINER
Light infestations	1.2	11.7
Medium infestations	1.4	10
Heavy infestations	1.6	8.8

DO NOT apply to soils with less than 1% or more than 10% organic matter.

Application Information:

Water Volume: 61 L per acre

Pressure: 30 to 45 psi (200 to 300 kPa).

Nozzles: Flat fan with 50-mesh nozzle screens.

Incorporation:

Incorporate using S-tine or C-tine cultivators or tandem disk. Do not incorporate deeper than 4 inches (10 cm).

To ensure that the product remains in the top 2 inches (5 cm) of soil, apply to a firm seedbed free of large clods or lumps. If using tandem disks, set disks to work the soil at a depth of 4 inches (10 cm) and operate at a speed of 4 mph (6 km/hr). If using an S-tine cultivator, set the implement to work the soil to a depth of 4 inches (10 cm) and operate at a speed of 6 mph (10 km/hr).

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Extended periods of dry soil conditions may result in reduced weed control. Moderate rainfall after application will enhance activity. Heavy rainfall following application of *Primextra II Magnum* may dilute the metolachlor deeper than 2 inches (5 cm) and result in reduced weed control, particularly on light textured soils.

Tank Mixes:

Herbicides: None registered.

Fertilizers: May be tank mixed with liquid fertilizer for preplant incorporated applications. Conduct a compatibility test by performing a jar test prior to mixing the products in the tank. May be impregnated onto dry bulk fertilizers (except nitrate or superphosphate fertilizers or limestone).

Insecticides: None registered.

Note: The above mixes are those listed on the *Primextra* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Moderate rainfall shortly after application will enhance activity. Heavy rainfall reduces weed control by leaching the chemical out of the top few centimeters of soil. Inadequate rainfall after application (within 10 days) will cause reduced weed control.

Re-entry: DO NOT re-enter treatment area within 12 hours of application.

Grazing: DO NOT graze or cut corn for feed before ear emergence.

Re-cropping: This product contains *Atrazine*. All crops except corn and triazine-tolerant canola may be affected the year following the use of *Atrazine*. Other more sensitive crops may be affected two or more growing seasons after application.

Aerial Application: DO NOT apply by air.

Storage: Store in a dry place.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:	
	Aquatic habitat	Terrestial habitat
Ground only*	29	10

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

DO NOT mix or load this product within 30 m of any sensitve aquatic habitats

Tank Cleaning:

Refer to page 15.

Hazard Ratings

▽ Caution Poison

▽ Caution – Eye Irritant
Potential Skin Sensitizer

For an explanation of the symbols used here see page 11.

Prism SG

Herbicide Group
2 - rimsulfuron
(Refer to page 38)

Company:

E. I. duPont Canada Inc. (PCP#30057)

Formulation:

25% rimsulfuron formulated as a water soluble granule.
Container size - 480 g.

Crops and Staging:

Irrigated potatoes* prior to flower initiation.

Potato tolerance differs by variety. Limit first use to a small area of each variety prior to widespread adoption in the field. Delay cultivation for 7 to 10 days after application.

** NOTE - Since applications to irrigated potato in western Canada has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance.* ***Application to irrigated potato in western Canada is at the risk of the user.***

Weeds and Staging:

WEED	STAGE
Barnyard grass Green foxtail Yellow foxtail Witchgrass	1 to 6 leaf stage, maximum 2 tillers
Quackgrass	3 to 6 leaf stage (less than 10 inches or 25 cm leaf extended).
Redroot pigweed Lamb's-quarters (suppression only)	4 to 6 leaf stage (less than 4 inches or 10 cm tall or across).

Rates:

24 g per acre (one package treats 20 acres).

Add a recommended non-ionic surfactant such as *Citowett Plus, Agsurf,* or *Agral 90* at 0.2 L per 100 L spray solution.

Make only one application per growing season.

Refer to the product label for complete mixing instructions for this product and its mixes.

A general guide to mixing can be found on page 13.

Application Information:

Water Volume: Minimum 40 L per acre.

Nozzles and Pressure: 25 to 40 psi (175 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE medium*** droplets. Use a 50 mesh or coarser screen and filter system.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Apply when the temperature 24 hours before and after application is between 5°C and 28°C. Temperatures beyond this range increase the potential for crop injury. Rapid fluctuations in temperature will stress the crop (greater than a 20°C difference within 24 to 36 hours). Allow 48 to 72 hours for the crop to acclimatize before spraying if severe temperature fluctuations occur. Crop injury may result if applications are made when potatoes are stressed by abnormally hot, humid, or cold weather conditions, frost, low fertility, drought, water saturated soil, compacted soil, previous pesticide applications, disease or insect damage. If potatoes have been injured by frost, wait 48 to 72 hours after normal growing conditions have resumed before applying.

Warm, moist conditions after application promote good weed control while cool and/or dry conditions may reduce or delay activity. Weeds hardened off by cold weather or drought stress may not be controlled.

Tank Mixes:

None registered.

Restrictions:

Rainfall: Within 2 to 4 hours may reduce control.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Preharvest: Leave 30 days from application to harvest.

Grazing: DO NOT graze the treated crop or cut for hay.

Re-cropping: Spring barley, soybeans, white beans, red clover, sorghum, potatoes and field corn may be planted the year after application. Winter wheat may be planted 4 months after application. For all other crops, a field bioassay is recommended before planting.

Aerial application: DO NOT apply by air.

Storage: May be frozen.

Buffer Zones:

Application method	Buffer Zones (metres[†]) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	5

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

[†] Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

DO NOT apply in areas where surface water from the treated area can run off to adjacent cropland, streams, irrigation water or wells.

Tank Cleaning:

DO NOT clean equipment near desirable trees or other plants. DO NOT contaminate water sources. Drain tank, hose down tank interior and flush clean water through hoses for a minimum of 5 minutes. Create a water-ammonia cleaning solution (1 L of minimum 3% household ammonia per 100 L water) in spray tank. Flush hoses and nozzles, and add water to fill tank. Circulate cleaning solution for 15 minutes, and flush through boom again. Wash nozzles and screens in cleaning solution in pail. Repeat above tank and hose cleaning procedure. Rinse system with clean water for 5 minutes. Prior to using sprayer for next application, flush system with fresh water for 5 minutes.

Refer to page 14 for additional information.

Hazard Rating:

⚠ Warning – Eye Irritant

Warning – Contains the allergen sodium sulfite.

For an explanation of the symbols used here see page 11.

Pulsar

Herbicide Group
4 - dicamba & fluroxypyr
(Refer to page 38)

Company:

Syngenta Canada

Formulation:

86.9 g/L dicamba and 113.3 g/L fluroxypyr formulated as an emulsifiable concentrate.
Container size - 2 x 9.82 L or 78.6 L

Crops and Staging:

Barley and spring wheat (including durum) from the 2 to 5 leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds, Rates and Staging:

Unless otherwise indicated apply when weeds are at the 2 to 3 leaf stage and rosettes are less than 2 inches (5 cm) across.

At 246 mL per acre (80 acre per case) *Pulsar* controls:

Cleavers
Kochia (up to 9-leaf)
Wild buckwheat*

At 371 mL/acre (53 acre per case) *Pulsar* controls the weeds above plus:

Lamb's-quarters*
Redroot pigweed*
Russian thistle
Stork's bill*
Volunteer flax
Wild buckwheat (up to 9-leaf)

* Suppression only

Application Information:

Water Volume: Minimum 44.5 L per acre.

Nozzles and Pressure: For conventional flat fan nozzles use a maximum pressure between 40 and 45 PSI (275 to 310 kPa) for the preformulated product. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE medium droplets***.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

DO NOT apply to crops that are stressed (frost, low fertility, drought or flooding, disease or insect damage) as crop injury or reduced weed control may result.

Tank Mixes:

Herbicides:

Barley, Spring wheat, and durum only:
MCPA LV600 ester (0.23 L/acre)

Spring wheat, and durum:
Horizon 240EC (93 mL/acre) plus *Score* adjuvant
Horizon NG (376 mL/acre)
Horizon NG (376 mL/acre) plus *MCPA LV600 ester* (0.23 L/acre)
Traxos (label rate)
Traxos (label rate) + MCPA Ester (rates above)

Fertilizers: None registered

Note: The above mixes are those listed on the *Pulsar* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Syngenta also supports the following mixes that are not on the *Pulsar* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides:

2,4-D Ester, Express SG, Refine SG, Sierra 2.0 (flucarbazone).

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 1 hour may reduce control.

Re-Entry: DO NOT enter treated fields for at least 12 hours.

Preharvest: Leave 60 days between treatment and harvest.

Grazing: Treated crops may be grazed, or cut for hay or silage after 7 days when used alone, or a minimum of 12 days when mixed or longer if the intervals are longer for the tank mix partner.

Re-cropping: Wheat, barley, oats, rye, forage grasses, flax, canola, mustard, lentils and peas may be grown the following season. There are no recropping restrictions the second year after application.

Aerial Application: DO NOT apply by air.

Storage: May be frozen. If frozen, bring to room temperature and agitate before use. This product is combustible. DO NOT store near heat or open flame.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:	
	Aquatic habitat	Terrestial habitat
Ground only*	15	15

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Legumes are particularly sensitive to *Pulsar*.

Handheld or backpack applications do not require a buffer.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Danger – Poison

◇ Warning – Eye Irritant

▽ Caution – Skin Irritant.

For an explanation of the symbols used here see page 11.

Quizalofop

Herbicide Group
1 - quizalofop
(Refer to page 38)

Company:

E. I. duPont Canada (*Assure II* - PCP#25462)
Gowan Canada (*Yuma GL* - PCP#30100)

Formulation:

96 g/L quizalofop-P-ethyl formulated as an emulsifiable concentrate.

Container size:
Assure II - 8 L *Assure II* + 8 L *SureMix* adjuvant, or 400 L tote.
Yuma GL - 8 L *Yuma GL* + 8 L *XA Oil Concentrate*.

Crops and Staging:

No leaf stage restrictions, but do not apply beyond Preharvest intervals listed in the table:

CROP	PREHARVEST INTERVAL (DAYS)
Camelina*††◇◇	64
Canola	64
Chickpea	85
Dry Edible Beans*†◇◇	30
Ethiopian Mustard *(Brassica carinata)**††	64
Faba Beans*††◇	30
Flax, or Solin (low linolenic acid flax)	82
Soybeans	80
Lentils	65
Oriental mustard (condiment types and oilseed quality types *Brassica juncea*)	64
Peas (field and processing)	65

† **NOTE:** While *Quizalofop* has been registered for use on all dry field bean types (except faba beans) not all types have been tested for tolerance. When using *Quizalofop* on a new dry bean type or variety for the first time evaluate tolerance on a small area first before applying large acreages and check with seed supplier for variety sensitivity.

Forage Crops (no Preharvest interval restrictions):

Alfalfa (seed production)

All seedling legume forage species for seed production* ◇◇

Creeping red fescue for seed (seedling or established)*. Established Alsike and Red Clover for seed production only†† ◇

†† *Assure II* only.

* *NOTE - Since applications to these crops have been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance.* ***Application to these crops is at the risk of the user.***

◇ If using *Assure II* with *Merge* adjuvant use low rate only.

◇◇ If using *Assure II* use with *SureMix* adjuvant only.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds, Rates and Staging:

Add one of the following registered adjuvants to the spray tank when applying quizalofop:

SureMix (0.5 L per 100 L of spray solution)**

Merge (0.5 to 1.0 L per 100 L of spray solution)

XA Oil Concentrate (0.5 to 1.0 L per 100 L of spray solution)***

Use the higher rate of *Merge* or *XA Oil Concentrate* when wild oats or quackgrass are present in the field or when growing conditions are poor.

** *SureMix* is packaged with small sizes of *Assure II.*

*** Use *XA Oil Concentrate* with *Yuma GL* only.

WEED	STAGE	RATE	
		L/ACRE	ACRES PER 8 L
Wild oat*	1 to 5 leaf prior to tillering	0.15	54
	up to 2 tillers	0.20	40
Green foxtail	2 leaf to early tillering	0.15	54
Volunteer wheat, barley & oat*	2 leaf to early tillering	0.15	54
Volunteer corn	2 to 6 leaf stage	0.15	54
Barnyard grass, yellow foxtail, proso millet, old witchgrass	2 leaf to early tillering	0.20	40
Quack grass suppression	2 to 6 leaf stage		
Foxtail barley†	3 to 4 leaf max 3 tillers		
Quack grass season long control	2 to 6 leaf stage	0.30	26

* Best results are likely to occur if applications are made before tillering begins. Apply at the 2 to 3 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are removed before tillering.

† Control with *Assure II* only and suppression with *Yuma GL*.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume:

Ground: Minimum 40 L per acre. Up to 162 L per acre of water may be used under heavy populations to improve coverage.

Aerial: Minimum 10 L per acre to a maximum of 20 L per acre.

Nozzles and Pressure: 30 to 40 psi (210 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets. Use a 50 mesh or coarser screen and filter system.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Crop injury may occur if crops are stressed because of drought or flooding. Less than acceptable weed control may be expected if weeds are under stress because of drought, flooding or cool weather.

Tank Mixes:

Herbicides:

In Canola: *Muster* (8 to 12 g/acre).

In Dry Beans (Pinto, Pink, Great Northern and Small Red): *Basagran* (label rates with *Quizalofop* at 0.25 L/acre plus *SureMix* adjuvant)

In Oriental Mustard (B. juncea condiment and oilseed): *Quizalofop* (0.15 to 2.0 L/acre) plus *Muster* (8 g/acre) plus *Merge* or *SureMix* adjuvants. DO NOT use on yellow mustard as injury will result.

In Soybeans:
Pinnacle (2.2 to 3.3 g/acre).
Quizalofop (0.25 L/acre) plus *Pinnacle* (2.2 to 3.3 g/acre) plus *Basagran Forté* (0.71 to 0.91 L/acre) plus *Merge* or *SureMix* to control grasses controlled by *Quizalofop* alone at 0.20 L/acre plus the broadleaf weeds controlled by *Pinnacle* and *Basagran Forté*.

In Established creeping red fescue for seed: *Quizalofop* at 0.2 to 0.3 L/acre may be tank mixed with *Ally* (3 g/acre). Allow 24 hours after application before applying a broadleaf herbicide. If the broadleaf herbicide is applied first, wait 7 days before application of *Quizalofop*.

Insecticides: None registered.

Fungicides: None registered.

Fertilizers: None registered.

Note: The above mixes are those listed on the *Quizalofop* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 1 hour of application may reduce control.

Grazing: DO NOT graze treated crops or cut for feed in the year of treatment.

Preharvest Interval: See '**Crops and Staging**' chart above.

Re-cropping: No restrictions the year after treatment.

Aerial Application: May be applied by air when used alone.

Storage: DO NOT freeze.

Buffer Zones:

Rates (L/acre)	Application method	Buffer Zones (metres†) Required for the Protection of:		
		Aquatic Habitats of Depths		Terrestrial habitat
		Less than 1 m	Greater than 1 m	
All rates	Ground *	1	0	3
Up to 0.15	Winged aircraft	0	0	70
	Helicopter	0	0	55
Up to 0.20	Winged aircraft	0	0	85
	Helicopter	0	0	70
Up to 0.30	Winged aircraft	1	0	125
	Helicopter	1	0	100

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones for ground applications can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Danger – Corrosive to eyes

⚠ Skin irritant, Potential skin sensitizer

For an explanation of the symbols used here see page 11.

Reclaim

Herbicide Group
2 - metsulfuron
4 - aminopyralid & 2,4-D
(Refer to page 38)

Company:

Dow AgroSciences

Formulation:

***Reclaim A* (PCP#29751):** 52.5% aminopyralid + 9.45% metsulfuron methyl formulated as a water dispersible granule.
Container size - 1.84 kg

***Reclaim B* (PCP#29750):** 564 g/L 2, 4-D Ester formulated as an emulsifiable concentrate.
Container size - 2 x 8 L

NOTE: Limited availability through selected retail outlets.

Crops and Staging:

Rangeland and pastures - Apply in spring or early summer.

Weeds, Rates and Staging:

Apply when weeds are young and actively growing in the vegetative stage.

Reclaim A: Apply at 92 g per acre.

Reclaim B: Apply at 0.8 L per acre.

One case treats 20 acres.

Weeds Controlled:

The following broadleaf weeds, invasive plants and shrubs will be controlled for 24 months after application.

- Canada Thistle
- Prairie sage
- Dandelion
- Wild Rose
- Wolf willow (Silver-berry)
- Shrubby cinquefoil
- Buckbrush (western snowberry)
- Pasture sage (fringed sage)

Application Information:

Water Volume:
Ground application: 45 L per acre minimum. For better coverage apply at 80 L per acre.
Aerial application: 20 L per acre minimum

Nozzles and Pressure: Use a combination of application equipment and pressures that will apply ***ASABE coarse*** droplets in a uniform pattern. Drift of even small amounts of Reclaim into sensitive plants or areas where sensitive crops may be grown can cause injury. DO NOT apply under conditions prone to drift (i.e. high winds, dead calm, or temperature inversions).

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Application should be avoided when pasture and targeted weeds are under stress of drought, excess moisture, extreme heat or cold or other environmental stresses. Target weeds must be actively growing. Avoid applications when temperatures exceed 28°C.

Tank Mixes:

None registered

Restrictions:

Rainfall: No rainfast period is specified on the label. Contact manufacturer for more information.

Re-entry: DO NOT re-enter treated areas for 12 hours.

Grazing: DO NOT allow lactating dairy animals to graze treated areas within 7 days of application. Withdraw meat animals from treated areas and feed untreated feed for at least 3 days before slaughter. DO NOT harvest forage or cut hay within 30 days of application.

Re-cropping: DO NOT apply to pastures where legumes are an essential component. DO NOT break up treated pasture and plant to sensitive broadleaf crops for at least 3 years after application.

Aerial Application: May be applied by air.

Storage: Store product in original, labeled containers in a secure, dry, cool area. DO NOT freeze.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:	
	Aquatic habitat	Terrestial habitat
Ground*	10	15
Fixed wing airplane	80 to 175**	250 to 750**
Helicopter	70 to 150**	175 to 650**

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

** Distance varies depending on spray droplet size. Consult the *Reclaim* label to determine buffer zone size when applying by air.

† Distance is measured from the downwind edge of the boom to sensitive areas.

DO NOT apply this product directly to any water body or mix or load near water or wells. DO NOT apply when heavy rains are forecast or on moderate to steep slopes toward sensitive areas or to light soils with shallow water table. Contact the provincial environment department for permits to apply near water.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Warning – Poison

For an explanation of the symbols used here see page 11.

Reglone (2012)

See diquat on page 134.

Reflex*

Herbicide Group
14 - fomesafen
(Refer to page 38)

***(For use only in the Red River Valley of Manitoba)**

Company:

Syngenta Canada (PCP#24779)

Formulation:

240 g/L fomesafen formulated as a solution.

Container size - 10 L.

Crops and Staging:

Dry beans◊ in the 1 to 2 trifoliate leaf stage. For use in the Red River Valley of Manitoba only.

◊ *NOTE - Since applications to beans in the Red River Valley has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance.* ***Application to beans is at the risk of the user.***

Weeds and Staging:

Broadleaf weeds controlled by *Basagran* at the 0.71 L per acre rate plus improved control of the following weeds up to the 4-leaf stage:

Cocklebur
Eastern black nightshade
Lady's-thumb
Lamb's-quarters
Ragweed (common)
Redroot pigweed*
Wild mustard

* Suppression only

Rate:

Reflex is registered in the Red River Valley of Manitoba only as a tank mix at a rate of 235 mL per acre *Reflex* plus 0.71 L per acre *Basagran* plus *Agral 90* at 1 L per 1000 L of spray solution.

Application Information:

Water Volume: Minimum 81 L per acre. Increase water volume to 142 L per acre for fields with heavy weed densities or with weeds at the upper limit of their recommended stage.

Pressure: 275 kPa (40 psi). Increase pressure to 420 kPa (60 psi) for fields with heavy weed densities or with weeds at the upper limit of their recommended stage.

Nozzles: Use nozzles capable of delivering appropriate pressures and volumes.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Weed control and crop tolerance may be reduced under certain stress conditions such as cold temperatures, excess moisture, drought and injury from hail or previous herbicide applications.

Tank Mixes:

Herbicides: *Reflex* is only registered for use in a *Basagran* tank mix. See Rates.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Restrictions:

Rainfall: Within 4 hours may reduce control.

Grazing: DO NOT graze treated crop or cut for hay. There is insufficient data to support such use.

Preharvest: Leave at least 84 days from application to harvest.

Re-cropping: Winter wheat may be sown 4 months after application. Spring wheat, dry beans, soybeans and field corn may be grown the year following an application.

DO NOT apply *Reflex* to any field more often than once every 2 years.

These re-cropping restrictions refer only to the Red River Valley of Manitoba. Use outside this is region is not registered as re-cropping options have not been determined.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool place away from food or feed.

Buffer Zones: Leave a buffer zone of at least 15 m between the last spray swath and the edge of sensitive terrestrial areas such as shelterbelts, hedgerows and shrublands as well as aquatic areas such as ponds, streams, rivers, prairie potholes and sloughs. DO NOT apply when winds are greater than 15 km/hr.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Danger – Corrosive to Eyes

For an explanation of the symbols used here see page 11.

Restore

Herbicide Group
4 - aminopyralid & 2,4-D
(Refer to page 38)

Company:

Dow AgroSciences

Formulation:

Restore A **(PCP#28551):** 240 g/L aminopyralid formulated as a solution. Container size - 3 L, or 450 L bulk.

Restore B **(PCP#28552):** 564 g/L 2, 4-D formulated as dimethylamine solution. Container size - 2 x 7.65 L or 450 L bulk

Note: Limited availability through selected retail outlets.

Crops and Staging:

Rangeland and pastures - Apply in spring or early summer.

Weeds, Rates and Staging:

Apply when weeds are young and actively growing in the vegetative stage.

Restore A: Apply at 0.2 L per acre.

Restore B: Apply at 1 L per acre.

(One case treats 15 acres)

Weed Controlled:

Absinth wormwood
Annual sow-thistle
Bluebur
Blue lettuce
Bull thistle
Burdock ***
Buttercup
Canada thistle
Canada goldenrod
Cocklebur
Common plantain
Common tansy*
Curled dock***
Dandelion
Flixweed
Goat's-beard
Gumweed
Hawkweed
Hoary cress
Perennial sow-thistle
Peppergrass
Prickly lettuce
Ragweeds
Scentless chamomile
Spotted knapweed
Stinging nettle
Sweet clover

* Season long control.
*** Less than 4-leaf.

Application Information:

Water volume:
Ground application: 40 L per acre minimum.
Aerial application: 20 L per acre minimum

Nozzles and Pressure: Use a combination of application equipment and pressures that will apply ***ASABE coarse*** droplets in a uniform pattern.

Drift of even small amounts of Restore into sensitive plants or areas where sensitive crops may be grown can cause injury. DO NOT apply under conditions prone to drift (i.e. high winds, dead calm, or temperature inversions).

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Application should be avoided under conditions of drought or other environmental stress.

Tank Mixes:

None registered.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Re-entry: DO NOT re-enter treated areas for 12 hours.

Grazing: DO NOT allow lactating dairy animals to graze treated areas within 7 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter. DO NOT harvest forage or cut hay within 30 days of application. Allow 3 days of grazing on an untreated pasture (or feed untreated hay) before transferring livestock to areas where sensitive broadleaf crops may be grown.

Re-cropping: If legumes are essential in a pasture, DO NOT use *Restore*. DO NOT break up treated pasture and plant to sensitive broadleaf crops for at least 3 years after application of *Restore*.

Aerial Application: May be applied by air.

Storage: Store product in original, labelled containers in a secure, dry, cool area. DO NOT freeze.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:	
	Aquatic Habitats	Terrestrial habitat
Ground *	10	10
Fixed wing airplane	80 to 175**	80 to 175**
Helicopter	70 to 150**	70 to 150**

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

** Distance varies depending on spray droplet size. Consult the Restore label to determine buffer zone size when applying by air.

† Distance is measured from the downwind edge of the boom to sensitive areas.

DO NOT apply this product directly to any water body or mix or load near water or wells. DO NOT apply when heavy rains are forecast or on moderate to steep slopes toward sensitive areas or to light soils with shallow water table. Contact the provincial environment department for permits to apply near water.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Warning – Poison

For an explanation of the symbols used here see page 11.

Retain

Herbicide Group

2 - thifensulfuron & tribenuron
4 - fluroxypyr & 2,4-D
(Refer to page 38)

This product is a prepackaged tank mix of the equivalent of *thifensulfuron/tribenuron* (page 270) and *fluroxypy + 2,4-D* (page 164). Information listed is restricted to Crop, Weeds and Rates. For other detailed information on the component products see the product pages listed above.

Company:

Viterra

Formulation

The *Retain* package has 3 components:

***Retain DF* (PCP#29570):** 50% thifensulfuron methyl plus 25% tribenuron methyl formulated as a water dispersible granule.
Container size - 320 g

***Attain A* (PCP#24834):** 180 g/L fluroxypyr.
***Attain B* (PCP#24833):** 564 g/L 2,4-D LV ester.
Both formulated as emulsifiable concentrates.
Container sizes:
Attain A: 4.8 L, ***Attain B:*** 8 L.

Crops and Staging:

Spring wheat (NOT including durum), barley - 4 leaf to flag leaf stage.

Weeds and Staging:

Apply from the seedling to 4 leaf or whorl stage of the following weeds:

Weeds controlled by *thifensulfuron/tribenuron* plus cleavers*

* Not Group 2 resistant biotypes

Rates

Retain DF: 8 g per acre.
Attain A: 0.12 L per acre
Attain B: 0.2 L per acre
One case per 40 acres

Add *Agral 90, Agsurf,* or *Citowett Plus* at 0.2 L per 100 L of spray solution. Retain may degrade if left in the sprayer for an extended period. Apply within 24 hours of mixing.

Refer to the product label for complete mixing instructions.

A general guide to mixing can be found on page 14.

See component products for more information on restrictions application details and handling. Use the most limiting restrictions across all components for the mix

Reward

Herbicide Group
22 - diquat
(Refer to page 38)

Company:

Syngenta Canada, distributed by True North Specialty Products (PCP#26271)

Formulation:

240 g/L diquat formulated as a solution.

Container sizes: 4 x 3.78L.

Use:

For use in farm dugouts and other clear, slow moving water bodies to control water weeds, such as:

Canada water weed
Coontail
Duckweed
Pond weeds
Water milfoil

Offers temporary control of certain species of algae. High levels of suspended organic matter or clay particles in water will reduce control.

NOTE: A permit must be obtained from Saskatchewan Environment or Manitoba Conservation for application of pesticides directly to or within a set distance of water bodies that are not wholly contained within a private parcel of land.

Timing:

Mid-May through late June when water weeds or algae are actively growing. Apply before weeds have developed a heavy mat of growth for effective control.

Rates:

Dugouts less than 5 feet (1.5 m) deep: Apply *Reward* at 7.4 L per acre.

At this rate, 2.2 L of *Reward* will treat a dugout that is 160 feet by 80 feet (49 m x 24.4 m).

Dugouts more than 5 feet (1.5 m) deep: Apply *Reward* at 10.1 to 11.8 L per acre.

At these rates, a dugout that is 160 feet by 80 feet (49 m x 24.4 m) will require 3.0 to 3.5 L of Reward.

Milfoil can be controlled in early stages by 3.7 L per acre in early stages of growth.

Application:

Dilute 1 part *Reward* with 4 parts clean water.

Spray over the water surface, inject below the water surface or pour directly onto the water surface from a moving boat or for small water bodies, apply from the banks. See label for detailed instructions. Note: *Reward* is bound rapidly to soil, so material must enter the water directly to be effective.

How it Works:

Refer to Table 2 on page 40.

Restrictions:

Grazing: DO NOT use water for animal consumption for 24 hours after application.

Irrigation: DO NOT use water for irrigation for 5 days after application.

Domestic Use: DO NOT use water for human consumption for 5 days after application. DO NOT swim in water for 24 hours after treatment.

Storage: DO NOT freeze.

Environment: If weed growth is dense, protect fish by not treating more than one-fourth of dugout at a time.

Equipment Clean Out:

Refer to page 15.

Hazard Rating:

☠ Warning – Poison

⚠ Caution – Skin Irritant

Potential Skin Sensitizer

For an explanation of the symbols used here see page 11.

Rustler (2011)

See glyphosate/dicamba on page 186.

Signal D

This product is the equivalent of a tank mix of *clodinafop* (page 122) and *bromoxynil/2,4-D* (page 112). Information listed is restricted to Crop, Weeds, Rates and Cost. For other detailed information on the component products see the product pages listed above.

Herbicide Group
1 - clodinafop
4 - 2,4-D
6 - bromoxynil
(Refer to page 38)

Company:

Nufarm Agriculture

Formulation:

The* Signal D *package has three components:

***Signal* (PCP#29172):** 240 g/L clodinafop-propargyl formulated as an emulsifiable concentrate.
Container size - 1.84 L

***Approve* (PCP#28123):** 225 g/L bromoxynil and 225 g/L 2,4-D ester formulated as an emulsifiable concentrate.
Container size - 10 L

***Signal Adjuvant* (PCP#29173):**
Container size - 6.4 L

Crops and Staging:

Spring wheat (including durum): 4 leaf stage up to the emergence of 4th tiller.

Weeds and Staging:

Grass Weeds: Same weeds and staging as *clodinafop* plus;
Broadleaf Weeds: Same weeds and staging as bromoxynil/2,4-D ester.

Rates:

Approve: 0.5 L per acre

Signal: 93 mL per acre

Signal adjuvant: 0.32 L per acre

(One case treats 20 acres)

Add *Approve* first, followed by *Signal* with the *Signal* adjuvant added last.

Application Information:

Water Volume: 40 L per acre

For other information including **How it Works; Effect of Environmental Conditions; Restrictions;** and **Hazard Rating.** See the information on individual component products on the *clodinafop* and *bromoxynil/2,4-D* pages

Signal M

Herbicide Group
1 - clodinafop
4 - MCPA
6 - bromoxynil
(Refer to page 38)

This product is a prepackaged tank mix of *clodinafop 240EC* (*Signal* page 122) and *bromoxynil/MCPA* (*Mextrol 450* page 113). Information listed is restricted to Crop, Weeds and Rates. For other detailed information on the component products see the product pages listed above.

Company:

Nufarm Agriculture (*Signal M*)

Formulation:

The Signal M package has three components:

***Signal* (PCP#29172):** 240 g/L clodinafop-propargyl formulated as an emulsifiable concentrate.
Container size - 1.84 L

***Mextrol 450* (PCP#26999):** 225 g/L bromoxynil and 225 g/L MCPA ester formulated as an emulsifiable concentrate.
Container size - 10.2 L

***Signal* adjuvant** (PCP#29173):
Container size - 6.4 L Each case treats 20 acres.

Crops and Staging:

Spring wheat (including durum): 2 leaf stage up to the emergence of 4th tiller.

Weeds and Staging:

Broadleaf weeds controlled by *bromoxynil/MCPA ester* plus grass weeds controlled by *clodinafop 240 EC.*

Rates:

Mextrol 450: 0.51 L per acre

Signal: 93 mL per acre

Signal adjuvant: 0.32 L per acre

One case treats 20 acres.

Add *Mextrol 450* first, followed by *Signal* with the adjuvant added last.

See component products for additional information on restrictions application details and handling. Use the most limiting restrictions of each component.

Simazine

Herbicide Group
5 - simazine
(Refer to page 38)

Company:

Syngenta Canada distributed by True North Specialty Products (*Princep Nine-T* - PCP#16370)

United Agri Products (*Simazine 480* - PCP#23181)

Formulations:

Princep Nine-T: 90% simazine formulated as a water dispersible granular. Container sizes: 5 kg.

Simazine 480: 480 g/L simazine formulated as a solution. Container sizes: 2 x 10L.

Crops and Staging:

Established alfalfa or bird's-foot trefoil (*Princep Nine-T* only):

DO NOT use in year of seeding. Apply after final cut in fall until freeze-up. DO NOT apply to the same field more than three consecutive years. Residues may build up with yearly applications.

Corn (Field and Sweet): Apply one week prior to seeding and incorporate to a depth of 1 inch (2.5 cm), OR apply no later than 4 days after seeding corn. Rainfall is required to activate herbicide.

Established shelterbelts (elm (American, Siberian), caragana, green ash, Manitoba (boxelder) maple): Apply in fall or early spring before weeds begin growth. Injury may occur to shelter belts growing under saline conditions.

DO NOT apply to frozen ground

Weeds and Staging:

Simazine is applied prior to the emergence of the weeds and kills them when they are exposed to the treated layer of soil.

- Barnyard grass
- Lamb's-quarters
- Perennial species starting from seed
- Purslane
- Ragweed
- Smartweed (including lady's-thumb)
- Volunteer clovers
- Wild buckwheat
- Wild oats
- Yellow foxtail

Rates:

Forage crops:
Princep Nine-T: 0.45 kg per acre.

Corn:[*]
Princep Nine-T: 0.61 to 0.81 kg per acre.

Simazine 480: 1.4 to 3.4 L per acre.

Shelterbelts:
Princep Nine-T: 1.8 kg per acre.

Simazine 480: 3.8 to 5.7 L per acre.

[*] Rate of application to corn is dependent on soil texture. Refer to specific labels for correct application rates on corn.

Application Information:

Water Volume: Minimum 121 L per acre. In shelterbelts, use a minimum of 202 L per acre.

Pressure and Nozzles: For conventional flat fan nozzles use a maximum pressure of 30 to 45 psi (200 to 300 kPa). Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets.

Use 50 mesh or coarser nozzle screens and filter system.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

When applying to forage stands, dry soil conditions at the time of weed emergence may result in reduced weed control.

Tank Mixes:

None registered.

Note: The above mixes are those listed on the simazine labels only. For additional mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Moderate rainfall after application enhances activity.

Re-Entry: DO NOT re-enter treated areas for 12 hours.

Grazing: In forage stands, allow 30 days between application and grazing, 60 days between application and cutting for feed. DO NOT graze or cut corn for feed prior to ear emergence.

Re-cropping: *Simazine* is persistent and residues may persist for several years depending on soil pH, available soil moisture, number of yearly applications, and the sensitivity of the following crop. *Simazine* will break down in soil more slowly under conditions of high pH and/or low rainfall. Corn will tolerate soil residues of *simazine* and may be planted the year of application. White beans, onions, peas may be injured 12 month after application.

Aerial Application: DO NOT apply by air.

Storage: DO NOT freeze *Simazine 480*. *Princep Nine-T* may be frozen. Store in a cool, dry place.

Buffer Zones:

Crops	Buffer Zones (metres[†]) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Alfalfa	1	1	4
Bird's-foot trefoil, sweet corn	1	1	5
Field corn	1	1	10
Shelter-belts	2	1	20

See the key to product pages on page 27 for an explanation of the different habitats.

[*] Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

[†] Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Caution – Poison. *(Simazine 480)*

For an explanation of the symbols used here see page 11.

Simplicity

Herbicide Group
2 - pyroxsulam
(Refer to page 38)

Company:

Dow AgroSciences (PCP#28887)

Formulation:

30 g/L pyroxsulam formulated as an oil dispersion.
Container size - 2 x 8 L jug.

Crops and Staging:

Wheat (Spring, and durum): 3 leaf stage until first node can be felt in the stem (up to 6 leaf plus 2 tillers).

Winter wheat: 1 to 3 leaf stage in fall or 2 to 7 leaf plus 4 tillers in spring.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds, Rates and Staging:

Wild oats (less than 75 plants per sqm):
0.15 L per acre (one case treats 106 acres)
All weeds listed below: 0.20 L per acre (one case treats 80 acres).
Shake *Simplicty* jug well before adding to spray tank.

Grasses:

WEED	STAGE
Wild oat	up to the 4 leaf, 2 tillers
Barnyard grass, Yellow foxtail Green foxtail*	1 to 5 leaf
Japanese brome	1 to 6 leaf
Downy brome†	

Broadleaves:

Cleavers (up to 6 whorl)
Cow cockle (up to 8 leaf)
Common chickweed (up to 10 cm)
Dandelion* (spring rosettes <20 cm diameter)*
Flixweed (up to 10 cm)
Hemp-nettle (1-8 leaf)
Redroot pigweed (1-8 leaf)
Smartweed (1-5 leaf)
Volunteer canola (1-6 leaf)**
Wild buckwheat (1-4 leaf) *

* Suppression only.
** Not Clearfield varieties
† Control with fall application in winter wheat ; suppression only in spring applications on both winter and spring wheat.

When applied alone, *Simplicity* must be applied using a non-ionic surfactants (*Agral 90, AgSurf* or *Surf 92*) at 0.25 L per 100 L.
Winter wheat (Simplicity alone) use one of the following adjuvants:
Assist at 0.8 L per 100 L of spray
Merge at 0.5 L per 100 L of spray (spring application only)
* Adjuvants purchased separately.

Application Information:

Water Volume:
Ground: 20 to 40 L per acre.
Aerial: 20 L per acre
Nozzles and Pressure: Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE coarse* droplets. See the label for detailed instructions on aerial application.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

DO NOT apply to crops that are stressed (frost, low fertility, drought or flooding, disease or insect damage) as crop injury may result and/or weed control may be reduced.

Tank Mixes:

Herbicides:

The addition of an adjuvant is not required in tank mixes unless the adjuvant is required by the tank mix partner.

TANK-MIX PARTNER	PRODUCT RATES
Buctril M	0.4 L per acre
Curtail M	0.6 L per acre
Frontline 2,4-D	60 acres per case
Frontline XL	0.5 L per acre
MCPA ester (500 formulation)	0.28 to 0.45 L per acre
Prestige XC	27 acres per case
Spectrum	20 acre per case
Thumper	0.4 L per acre

Fungicides:
*Tilt** (label rates)
*Stratego**(label rates)
*MCPA + Tilt **
*MCPA + Stratego**

Fertilizers: None registered

* High rate of *Simplicity* only.

Note: The above mixes are those listed on the *Simplicity* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Dow AgroSciences also supports the following mixes that are not on the *Simplicity* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides: *2,4-D ester, Attain XC* (low use rate), *Attain XC* + either *Tilt* or *Stratego, Barricade, Bromoxynil, OcTTain, Retain, Stellar, Thifensulfuron/tribenuron* (incl. *+Perimeter MEGA*).

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13

Restrictions:

Rainfall: Within 4 hours may reduce control.

Preharvest: Leave 60 days between treatment and harvest.

Grazing: Must NOT be grazed or fed to livestock for 7 days after treating crop.

Recropping: Barley, condiment and oilseed quality brown mustard (*B. juncea* types), canola, chickpea, dry beans, flax, lentils, oats, field peas, spring wheat, soybean, sunflower and yellow mustard may be seeded 11 months following treatment.

Aerial Application: May be applied by air.

Storage: Avoid freezing, store above -9°C. Allow product to warm above 7°C before using and thoroughly mix the product prior to use.

Buffer Zones:

Application method	Buffer Zones (metres[†]) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground*	1	1	2
Helicopter	1	1	55
Fixed wing aircraft	1	1	65

See the key to product pages on page 27 for an explanation of the different habitats.

* These distances can be reduced by 30% using cones on individual nozzles and by 70% using a full shield (shroud, curtain) that extends to the crop canopy.

[†] Distance is measured from the downwind edge of the boom to sensitive areas.

Tank Cleaning:

Equipment used to apply *Simplicity* should not be used to apply other pesticides to sensitive crops without thorough cleaning. To avoid subsequent injury to crops other than cereals, all spraying equipment must be thoroughly cleaned both inside and out, as follows:

1. Immediately after spraying drain the sprayer tank. Any contamination on the outside of the spraying equipment should be removed by washing with clean water.
2. Rinse inside of tank with clean water and flush through booms and hoses using at least one tenth of the spray tank volume. Drain tank completely.
3. Add *All Clear* tank cleaner at 0.5 L per 100 L of water or *Clean-Out* tank cleaner at 0.25 L per 100 liters of water while filling the tank ½ full with clean water. Agitate for 15 minutes ensuring the cleaning solution comes in contact with interior surfaces. Flush the boom and hoses with the cleaning solution and thoroughly drain the sprayer.
4. Remove nozzles and screens and clean separately with *All Clear* cleaning solution (50 mL in 10 L water).
5. Rinse the tank with clean water and flush through the booms and hoses using at least one tenth of the spray tank volume. Drain tank completely.

Refer to page 15.

Hazard Rating:

Warning – Poison

Warning – Contains the allergen soy

Caution – Eye and Skin Irritant, Potential Skin Sensitizer

For an explanation of the symbols used here see page 11.

Solo

Herbicide Group
2 - imazamox
(Refer to page 38)

Company:

BASF Canada

All crops listed under 'Crops And Staging:' below (PCP#25496)

CLEARFIELD canola only(PCP#28741)

Formulation:

70% imazamox as a water dispersible granule.

Container size - 4 x 117 g water soluble bags.

Crops and Staging:

CLEARFIELD sunflower: 2 to 8 leaf stage.

CLEARFIELD canola: 2 to 6 leaf stage.

CLEARFIELD lentil: 2 to 6 leaf stage.

CLEARFIELD oilseed mustard (*Brassica juncea*): 2 to 6 leaf stage

Dry Beans: Up to the second trifoliate leaf stage. Must be mixed with *Basagran Forté* – See tank mix section.

Temporary crop yellowing may be observed shortly after application in field peas and CLEARFIELD canola.

Weeds and Staging:

Grasses - 1 to 4 main stem leaves, early until tillering.

Barnyard grass
Green foxtail
Japanese brome*
Persian darnel
Volunteer barley
Volunteer canaryseed
Volunteer oat
Volunteer wheat (not CLEARFIELD varieties)
Wild oat
Yellow foxtail

Broadleaf Weeds - cotyledon to 4 leaf stage.

Cleavers*
Cow cockle
Green smartweed
Kochia*†
Lamb's-quarters
Redroot pigweed
Shepherd's-purse
Stinkweed
Volunteer canola (not CLEARFIELD varieties)
Wild buckwheat*
Wild mustard

* Suppression only.

† *NOTE: Surveys of fields with kochia have found that roughly 90% of these kochia populations were resistant to Group 2 herbicides. Without testing that confirms otherwise, assume that kochia in your field is likely resistant as well and is unlikely to be suppressed by* Solo *alone.*

Rates:

Solo: 11.7 g per acre (40 acres per case)

***Merge* adjuvant (sold separately):** Must be used with *Solo* at a rate of 0.5 L of *Merge* per 100 L of total mixed spray solution.

DO NOT apply *Solo* more than once or follow *Solo* with any products containing imazamox in the same year.

Refer to the product label for complete mixing instructions for this product and its mixes.

A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 40 L per acre.

Nozzles and Pressure: Use 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift. Use 50 mesh or coarser filter screens.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

DO NOT spray if temperatures of +5ºC are forecast within 3 days of application. Treat crops during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced.

Tank Mixes:

Dry Beans:

Solo must be mixed with *Basagran Forté* (0.5 L/acre) plus UAN (liquid 28-0-0) at 0.81 L/acre. The addition of 28% UAN is required for proper activity.

Restrictions:

Rainfall: DO NOT spray if there is a forecast of rain during or soon after application as it may reduce control.

Grazing: DO NOT graze treated canola, field pea, or lentils or cut for feed within 20 days of application.

DO NOT graze treated sunflower or cut for straw.

Preharvest Interval: DO NOT apply to canola or lentil within 60 days of harvest.
DO NOT apply to sunflower within 70 days of harvest.

Re-cropping: Winter wheat may be seeded 3 months after application. Barley, canaryseed, canola, chickpea, field corn, field pea, flax, lentil, oat, sunflower, and spring wheat (including durum) may be seeded the first spring after application and tame mustard (condiment types only) the second season after application. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above.

Contact manufacturer for additional information on recropping intervals (1-877-371-2273).

Aerial Application: DO NOT apply by air.

Storage: DO NOT freeze. Store in a cool, dry place above 5° C.

Buffer Zones: Avoid spraying in situations where drift may occur. Leave at least 11 m between the outside edge of the sprayed area and sensitive non-target areas such as shelterbelts, hedgerows, wetlands, woodlots, vegetated ditch banks, ponds, streams, and sloughs.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

⚠ Warning – Eye and Skin Irritant.
May cause eye damage.

For an explanation of the symbols used here see page 11.

Spectrum

Herbicide Group
2 - florasulam
4 - clopyralid & MCPA
(Refer to page 38)

Company:

Dow AgroSciences

Formulation:

Each case of *Spectrum* contains 2 components:

***Spectrum A* (PCP#27031):** 50 g/L florasulam formulated as a suspension concentrate. Container size - 0.8 L

***Spectrum B* (PCP#27032):** 50 g/L clopyralid and 280 g/L of MCPA ester formulated as an emulsifiable concentrate. Container size - 12 L.

Crops and Staging:

Spring wheat (including durum), barley and oats in the 2 to 6 leaf stage.

Forage Grasses* (seedling and established) grown for seed production: No staging indicated for forage grasses.

Bromegrass (meadow, smooth, hybrid)
Fescue (chewings, creeping red, hard, tall)
Perennial Ryegrass
Timothy
Wheatgrass (crested, intermediate)

* *NOTE: Since these uses are registered under the User Requested Minor Use Label Expansion (URMULE) program, the manufacturer assumes no responsibility for herbicide performance.* ***Users of this product on forage grasses do so at their own risk.***

Weeds and Staging:

Broadleaf weeds controlled at the 2 to 4 leaf stage:

Canada thistle
Chickweed
Cleavers
Dandelion**
Flixweed*
Hemp-nettle
Lamb's-quarters
Redroot pigweed
Shepherd's-purse
Smartweed
Sow-thistle (annual)
Sow-thistle (perennial)†
Stinkweed
Stork's-bill
Volunteer canola (all varieties)
Wild mustard
Wild buckwheat

Broadleaf weeds suppressed:
Dandelion***

* Spring seedlings only.
** Seedlings and overwintered rosettes < 15 cm.
*** Overwintered rosettes > 15 cm; mature plants.
† Top growth control only.

Rates:

Spectrum A: 40 mL per acre

Spectrum B: 600 mL per acre

One case treats 20 acres.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 40 L per acre.

Nozzles & Pressure: Maximum 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use nozzles and pressure designed to deliver thorough, even coverage with ***ASABE coarse*** droplets.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Warm, moist growing conditions promote active weed growth and enhance activity of *Spectrum.* Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and regrowth may occur. Under conditions of low crop and high weed density, control may be reduced. Extreme growing conditions such as drought or near freezing temperature prior to, at, or following time of application, may increase the risk of crop injury at all stages of growth.

Tank Mixes:

Herbicides:

In spring wheat (including durum) and barley:
Assert (0.65 L/acre) plus *Acidulate*

In spring wheat (NOT durum) and barley:
Axial 100EC (243 mL/acre) plus *Adigor* adjuvant

In spring wheat (including durum) only:
Everest 70WDG (17.4 g/acre) plus non-ionic surfactant

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *Spectrum* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Dow AgroSciences also supports the following mixes that are not on the *Spectrum* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides: *Assert plus ½ rate Puma*^{120} *Super, Avenge.*

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Re-Entry: DO NOT re-enter treated fields for 12 hours.

Grazing: DO NOT graze treated crop or cut for feed within 7 days of application.

Preharvest: DO NOT apply within 60 days of harvest.

Re-cropping: Barley, canola, field peas*, oats and wheat may be grown the year following an application or the field can be summerfallowed.

* *DO NOT seed to field peas for at least 10 months following treatment. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application delay seeding field peas an additional 12 months (22 months following application). Contact your local Dow AgroSciences representative or retailer for more information before seeding field peas following drought conditions in the previous year.*

Aerial Application: DO NOT apply by air.

Storage: Store in dry, heated (greater than 5ºC) area. *Spectrum A* will freeze at -10ºC. If frozen, bring to room temperature and agitate before use.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	5	5	30

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

Handheld or backpack applications do not require a buffer.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Caution – Poison

⚠ May cause eye irritation

For an explanation of the symbols used here see page 11.

Stellar

Herbicide Group
2 - florasulam
4 - MCPA
(Refer to page 38)

Company:

Dow AgroSciences

Formulation:

***Stellar A* (PCP#29286):** 2.5 g/L florasulam and 100 g/L fluroxypyr formulated as a suspension concentrate.
Container size - 2 x 8 L jug.

***Stellar B* (PCP#29165):** 600 g/L of MCPA ester formulated as an emulsifiable concentrate.
Container size - 1 x 9.33 L jug.

Crops and Staging:

Barley, oats and spring wheat (including durum) - 2 to 6 leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Apply when weeds are at the 2 to 4 leaf stage.

Burdock
Chickweed (Common)
Cleavers
Cocklebur
Flixweed
Hemp-nettle
Kochia
Lamb's-quarters
Plantain
Prickly lettuce
Ragweed
Redroot pigweed
Russian pigweed
Shepherd's-purse
Smartweed
Stinkweed
Stork's-bill*
Sunflower (annual)
Vetch
Volunteer canola
Volunteer flax
Wild buckwheat
Wild mustard
Wild radish

* Suppression only

Rates:

Stellar A: 0.4 L per acre

Stellar B: 0.24 L per acre
(One case treats 40 acres)

Application Information:

Water Volume: Minimum 40 L per acre.

Nozzles & Pressure: For conventional flat fan nozzles use a pressure of 30 to 40 PSI (200 to 275 kPa). Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE coarse*** droplets. Low drift nozzles may require higher pressures for proper performance.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

DO NOT apply to crops or weeds that are stressed (frost, low fertility, drought or flooding, disease or insect damage) as crop injury or reduced weed control may result.

Tank Mixes:

Herbicides:

Barley, spring wheat, and durum:
Assert (0.65 L/acre)

Spring wheat (not durum) and barley only:
Axial 100EC (243 mL/acre) plus *Adigor* adjuvant

Spring wheat, and durum only:
Everest 70WDG (17.4 g/acre) plus recommended surfactant

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *Stellar* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Dow AgroSciences also supports the following mixes that are not on the *Stellar* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides: *Assert+Puma^{120} Super (half rate), Simplicity.*

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Preharvest: Leave 60 days between treatment and harvest.

Grazing: DO NOT graze or harvest for livestock feed within 7 days of treating the crop.

Recropping: Wheat, barley, oats, canola, and peas may be grown the season following application or the field may be fallowed. There are no recropping restrictions the second year after application.

Aerial Application: DO NOT apply by air.

Storage: May be frozen. If frozen, bring to room temperature and agitate before use. This product is combustible. DO NOT store near heat or open flame.

Buffer Zones: Leave 30 metres between the downwind edge of the boom and sensitive terrestrial habitats such as forested areas shelterbelts, woodlots, hedgerows, and shrub lands and 15 metres to sensitive freshwater habitats such as lakes, rivers, sloughs ponds, prairie potholes, creeks marshes streams reservoirs and wetlands.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

◈ Warning – Poison

◇ Warning – Eye and Skin Irritant.

▽ Potential skin sensitizer.

For an explanation of the symbols used here see page 11.

Tandem

Herbicide Group
2 - pyrosulam
4 - fluroxypyr
(Refer to page 38)

Company:

Dow AgroSciences

Formulation:

The *Tandem* package has 2 components:
***Tandem A* (PCP# 29985):** 30 g/L pyroxsulam formulated as an oil dispersion.

Container size - 8 L jug.

***Tandem B* (PCP# 29965):** 333 g ae/L fluroxypyr formulated as an emulsifiable concentrate.

Container size - 4.84 L

Crops and Staging:

Spring wheat (including durum): 3 leaf stage until the first node can be felt in the stem (up to 6 leaf plus 2 tillers).

When tank-mixing always check the tank mix partner recommendations for additional staging restrictions.

Winter wheat: Apply in the spring from the 3 tiller stage to just before the flag leaf stage.

Weeds, Rates and Staging:

***Tandem A* at 0.15 L per acre plus *Tandem B* at 85 mL per acre (53 acres per case):**
Cleavers (up to 6 whorls)
Wild oats (less than 75 plants per sqm)

***Tandem A* at 0.20 L per acre plus *Tandem B* at 127 mL per acre (40 acres per case):**

Grasses:

WEED	STAGE
Wild oat	up to the 4 leaf, 2 tillers
Barnyard grass, Yellow foxtail Green foxtail*	1 to 5 leaf
Japanese brome	1 to 6 leaf

Broadleaves:

WEED	MAXIMUM APPLICATION STAGE
Wild buckwheat	4 leaves
Smartweed	5 leaves
Round-leaved mallow, Volunteer canola**	6 leaves or whorls
Cleavers, Cow cockle, Hemp-nettle†, Kochia†, Redroot pigweed, Stork's-bill*	8 leaves or whorls
Common chickweed, Flixweed	10 cm
Volunteer flax	12 cm
Dandelion*	spring rosettes <20 cm diameter

* Suppression only.

** Not Clearfield varieties

† NOTE Group 2 resistant biotypes only controlled at smaller stage. See label for details.

Application Information:

Water Volume:

Ground: 20 - 40 L per acre.

Aerial: 20 L per acre. Consult label for buffer zones

Nozzles and Pressure: Use 29 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE coarse*** droplets. Low drift nozzles may require higher pressures for proper performance. See the label for detailed instructions on aerial application.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost before application (3 days) or shortly after (3 days) may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions, (e.g. drought, heat or cold stress, or if weeds have initiated flowering), or if heavy infestations exist.

Tank Mixes:

Herbicides:

In spring wheat (including durum):

2,4-D Ester 700 (0.24 to 0.32 L/acre)

Curtail M (0.61 to 0.81 L/acre)

MCPA Ester (0.28 to 0.37 L/acre)

Fungicides:

Tilt, *Stratego*

Note: The above mixes are those listed on the *Tandem* label only. For other possible registered mixes see the blue fold out chart inside back cover.

Adding ingredients in the correct order is critical for optimum performance.

Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 4 hours may reduce control.

Re-entry: DO NOT re-enter treated fields for 12 hours.

Preharvest Interval: Leave 60 days from treatment to harvest.

Grazing: Must NOT be grazed or fed to livestock for 7 days after treating crop.

Recropping: Barley, canola, flax, lentils, mustard, oats, field peas, spring wheat may be seeded 11 months following treatment or fields may be fallowed.

Aerial Application: May be applied by air.

Storage: Avoid freezing, store above -9°C. Allow product to warm above 7°C before using and thoroughly mix the product prior to use.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	1	2
Helicopter	1	1	55
Fixed wing aircraft	1	1	65

See the key to product pages on page 27 for an explanation of the different habitats.

* These distances can be reduced by 30% using cones on individual nozzles and by 70% using a full shield (shroud, curtain) that extends to the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

Tank Cleaning:

Equipment used to apply *Tandem* should not be used to apply other pesticides to sensitive crops without thorough cleaning. To avoid subsequent injury to crops other than cereals, all spraying equipment must be thoroughly cleaned both inside and out, as follows:

1. Immediately after spraying drain the sprayer tank. Any contamination on the outside of the spraying equipment should be removed by washing with clean water.
2. Rinse inside of tank with clean water and flush through booms and hoses using at least one tenth of the spray tank volume. Drain tank completely.
3. Add *All Clear* tank cleaner at 0.5 L per 100 L of water or *Clean-Out* tank cleaner at 0.25 L per 100 liters of water while filling the tank ½ full with clean water. Agitate for 15 minutes ensuring the cleaning solution comes in contact with interior surfaces. Flush the boom and hoses with the cleaning solution and thoroughly drain the sprayer.
4. Remove nozzles and screens and clean separately with *All Clear* cleaning solution (50 mL in 10 L water).
5. Rinse the tank with clean water and flush through the booms and hoses using at least one tenth of the spray tank volume. Drain tank completely.

Refer to page 15.

Hazard Rating:

☠ Danger – Poison.

◇ Warning – Contains the allergens milk, soy and sulphites.

▽ Caution – Eye and Skin Irritant, Potential Skin Sensitizer

For an explanation of the symbols used here see page 11.

Tensile

Herbicide Group
2 - imazamox
4 - clopyralid
(Refer to page 38)

This product is a prepackaged tank mix of *Solo* (page 263) and *Lontrel Dry* (*Lontrel Dry* is only available with *Absolute* and *Tensile*) (page 210). Information listed is restricted to Crop, Weeds and Rates. For other detailed information on the effect of growing conditions, and restrictions for the component products see the product pages listed above.

Company:

BASF Canada

Formulation:

Tensile package contains 2 components:
***Solo* (PCP#28741):** 70% imazamox formulated as a dispersible granule.
***Lontrel Dry* (PCP#27306):** 75% clopyralid formulated as a dispersible granule.
Container size -
Solo: 4 x 117 g water soluble bags
Lontrel Dry: 2 x 810 g .

Crops and Staging:

CLEARFIELD canola varieties: 2 to 6 leaf stage.
Apply **only** to CLEARFIELD canola varieties; application to any other variety of canola or any other crop will result in crop death.

Weeds and Staging:

Weeds controlled by *Solo* plus.

Canada thistle (rosette to pre-bud stage)*
Sow-thistle, annual
Sow-thistle, perennial*
Wild buckwheat

* Top growth control for 6 to 8 weeks

Rates:

Solo: 11.7 g per acre.

Lontrel Dry: 40 g per acre.
(One case treats 40 acres)

Merge: 0.5 L per 100 L of spray solution (sold separately). At a spray volume of 40 L per acre one 8.1 L jug of *Merge* will treat 40 acres. *Tensile* MUST be applied with *Merge* adjuvant.

DO NOT apply *Tensile* more than once or follow *Tensile* with any related products in the same year.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Restrictions and Application Information:

See component products for additional information including restrictions. Use the most limiting restrictions across all components for the mix. Particular attention should be paid to the recropping restrictions for both *Solo* and *Lontrel*.

Thifensulfuron/tribenuron

Herbicide Group
2 - thifensulfuron & tribenuron
(Refer to page 38)

Company:

E. I. duPont Canada (*Refine SG*)
Arysta LifeSciences (*Deploy*)
Cheminova Canada (*Nimble*)

Formulation:

***Refine SG* (PCP#28285):** 33.35% thifensulfuron methyl plus 16.65% tribenuron methyl formulated as a water soluble granule.
Container size - 486 g bottle.

***Deploy* (PCP#29149); *Nimble* (PCP#29467):** 50% thifensulfuron methyl plus 25% tribenuron methyl formulated as a water dispersible granule.
Container size -
Deploy: 480 g container.
Nimble: 320 g container.

Crops and Staging:

Apply from 2 leaf to the flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions

Cereals:

- Barley
- Oats
- Wheat (including durum spring and winter),

*Do not use on Ledger barley or Belvedere wheat.

Seedling or established forage grasses for forage or seed production:*

- Bromegrass (meadow, smooth)
- Fescue (creeping red, tall)
- Kentucky bluegrass**
- Orchardgrass
- Wheatgrass (crested, intermediate, northern, pubescent, slender, streambank, tall, western)

* **NOTE:** *Since the use of this product on forage grasses is registered under the User Requested Minor Use registration system, the manufacturer assumes no responsibility for herbicide performance.* ***Users of this product on forage grass do so at their own risk.***

** Established stands only.

Weeds and Staging:

Unless otherwise noted below, apply to young and actively growing weeds that are less than 4 inches (10 cm) in height or width.

Weeds Controlled:

- Annual smartweed (green smartweed, lady's-thumb)
- Ball mustard
- Chickweed (1 to 6 leaf)
- Common groundsel
- Corn spurry
- Cow cockle
- Flixweed
- Hemp-nettle
- Kochia (Group 2 resistant biotypes with Banvel II tank mix only) †
- Lamb's-quarters
- Narrow-leaved hawk's-beard
- Redroot pigweed
- Russian thistle
- Shepherd's-purse
- Stinkweed
- Tartary buckwheat
- Volunteer canola (CLEARFIELD varieties controlled with 2,4-D or MCPA mixes only)
- Volunteer sunflowers
- Wild buckwheat*
- Wild mustard

* *Refine SG:* up to 5 leaf stage; *Deploy* and *Nimble*: up to 3 leaf stage only.

† *NOTE: Surveys of fields with kochia have found that roughly 90% of these kochia populations were resistant to Group 2 herbicides. Without testing that confirms otherwise, assume that kochia in your field is likely resistant as well and is unlikely to be controlled by thifensulfuron/tribenuron alone.*

Weeds Suppressed:

- Canada thistle, sow-thistle (less than 6 inches (15 cm) tall or across and prior to budding)
- Cleavers (1 to 3 whorls)
- Round-leaved mallow (2 to 6 leaf)
- Scentless chamomile
- Stork's-bill (2 to 6 leaves)
- Toadflax (less than 6 inches or 15 cm tall)

Rate:

Refine SG: 12 g per acre (one 486 g container treats 40 acres).

Deploy: 8 g per acre (one 480 g container treats 60 acres).

Nimble: 8 g per acre (one 320 g container treats 40 acres).

Maximum of one application of *Thifensulfuron/tribenuron* or other products with the same ingredients per year.

Add *Agral 90, Agsurf,* or *Citowett Plus* surfactants at 0.2 L per 100 L of spray solution.

Nimble may also use *Liberate* and *Nufarm Enhance* surfactants at 0.2 L per 100 L of spray solution.

Thifensulfuron/tribenuron may degrade if left in the sprayer for an extended period. ***Apply within 24 hours of mixing.*** Refer to the product label for complete mixing instructions.

A general guide to mixing can be found on page 14.

Application Information:

Water Volume:

Ground (Deploy, Nimble and Refine SG): Minimum 22 L per acre.

Aerial (Refine SG only): Minimum 10 L to maximum 20 L per acre.

Nozzles and Pressure: Use 30 to 40 psi (210 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE medium*** droplets. Use a 50 mesh or coarser screen and filter system.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

DO NOT apply to wheat, barley or oats that are stressed by severe weather conditions (frost, drought or water saturated soil) as crop injury may result.

Under certain conditions (heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures) lightening in crop colour and reduction in crop height may occur.

Susceptible kochia control may be reduced during stress conditions or if extremely heavy infestations exist.

Tank Mixes:

Herbicides:

Tank Mix Partner	CROPS				
	Spring wheat	**Winter wheat**	**Durum**	**Barley**	**Oats**
2,4-D amine or ester (0.34 to 0.45 L/acre)*†	✓	✓	✓	✓	
Assert (0.53 to 0.65 L/acre)	✓		✓ΔΔ	✓	
Assert (0.53 to 0.65 L/acre) + *MCPA* ester (0.28 to 0.45 L/acre)*	✓		✓ΔΔ	✓	
Axial 100EC (243 mL/acre) plus *Adigor* adjuvant	✓ΔΔ			✓ΔΔ	
Axial 100EC (243 mL/acre) + *MCPA* Ester (0.23◇ or 0.28 L/acre) plus *Adigor* adjuvant	✓ΔΔ			✓ΔΔ	
Banvel II (44.5 mL/acre to 58.7 mL/acre**)†	✓		✓Δ	✓	
Curtail M (0.61 L/acre) †	✓			✓	
Everest 70WDG (17.4 g/acre)	✓				
Everest 70WDG (8.7 g/acre to 17.4 g/acre) + *2,4-D* amine or ester (up to 0.45 L/acre)* †	✓Δ				
Everest 70WDG (17.4 g/acre) + *Banvel II* (44.5 to 58.7 mL/acre)* †	✓Δ				
Flurox 2,4 (one case treats 80 acres)†	✓ΔΔΔ		✓ΔΔΔ	✓ΔΔΔ	
Clodinafop 240EC (95 to 115 mL/acre) plus *Score* adjuvant	✓		✓		
Clodinafop 240EC (95 mL/acre) + *Banvel II* (44.5 mL/acre to 58.7 mL/acre**) plus Score adjuvant	✓ΔΔ		✓Δ		
Clodinafop 240EC (95 mL/acre) + *MCPA* ester (0.23◇ or 0.34 to 0.45 L/acre)* plus *Score* adjuvant	✓		✓		
Lontrel 360 (85 mL/acre) †	✓			✓	
Lontrel 360 (85 mL/acre) + *2,4-D* ester* or *MCPA* ester* (0.34 L/acre) †	✓			✓	
MCPA amine or ester (0.23 ◇ or 0.28 to 0.45 L/acre)*	✓	✓	✓	✓	✓
Fenoxaprop 120EC (0.16 to 0.31 L/acre)	✓		✓	✓	
Fenoxaprop 120EC (0.16 to 0. 31 L/acre) + MCPA ester (0.23◇ or 0.34 L/acre)*	✓		✓	✓	
Simplicity (0.15 to 0.20 L/ acre) †	✓Δ		✓Δ		

† Marked tank mixes require the addition of a non-ionic surfactant. Unmarked mixes do not require additional adjuvant beyond what is provided for by the tank mix partner.

Δ Mix only with *Refine SG.*

ΔΔ Mix only with *Refine SG* and *Nimble.*

ΔΔΔ Mix only with *Nimble.*

* 500 g ai/L formulation.

** High rate of *Banvel II* with *Refine SG* only.

◇ Tank mix with 0.23 L/acre to control *Clearfield* canola at the 2 to 4 leaf stage.

Check the above tank mix partner(s) respective labels for additional staging and varietal restrictions.

Fertilizers: None registered.

Note: The above mixes are those listed on the *Deploy, Nimble* and *Refine SG* labels only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Rainfall of 1 inch (25 mm) or more beginning within 1 hour of application of *Refine SG* or 4 hours for *Deploy* and *Nimble* may reduce control.

Re-Entry: DO NOT re-enter treated fields for 12 hours.

Grazing: Must NOT be grazed or fed to livestock for 7 days after treatment.

Re-cropping: No restrictions the year after treatment. Canola, flax, lentils and alfalfa may be planted 2 months after application.

Aerial Application: *Refine SG* may be applied by air. **DO NOT apply *Deploy* or *Nimble* by air.**

Storage: Store in a cool, dry place. May be frozen.

Buffer Zones:

Application method	Buffer Zones (metres[†]) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	0	15
Fixed wing airplane	1	0	125
Helicopter	1	0	100

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

[†] Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Deploy and Nimble (Ground equipment only):

Leave a 15 m buffer zone between last spray swath and sensitive upland or aquatic habitats such as shelterbelts, wetlands, sloughs, and woodlots.

Tank Cleaning:

Thifensulfuron/tribenuron can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray *Thifensulfuron/tribenuron* should be drained and flushed out immediately after use.

Step 1: Drain tank and flush tank, booms and hoses with clean water. If boom is equipped with multiple nozzle bodies, be sure to rotate through all nozzles to ensure clean water reaches all parts of these assemblies. After flushing inspect the tank to ensure removal of all visible herbicide residues. If necessary repeat Step 1.

Step 2: Fill the tank with clean water and add 1 L household ammonia (containing a minimum of 3% ammonia) or an equivalent amount of a sprayer cleaner containing ammonia, per 100 L of water. Ammonia does not deactivate the herbicide but makes it dissolve easier in rinse water to aid in removal. If *thifensulfuron/tribenuron* has been mixed with an emulsifiable concentrate formulation, the addition of a wetting agent (detergent) will also aid the cleaning process.

Step 3: Flush the ammonia solution through the boom and hoses, and then add more water to completely fill the tank. Allow this solution to sit for 15 minutes while agitating.

Step 4: Drain the tank. Repeat steps 2 and 3 for WDG formulations.

Step 5: Remove all nozzles and screens and clean separately in a bucket containing cleaning agent and water.

Step 6: Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing water through hoses and booms.

DO NOT clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Refer to page 14 for additional information.

Hazard Rating:

***Deploy* and *Nimble*:**

⚠ Warning – Eye and Skin Irritant

***Refine SG*:**

⚠ Warning – Contains the allergen milk.

For an explanation of the symbols used here see page 11.

Thifensulfuron/tribenuron + MCPA ester

Herbicide Group
2 - thifensulfuron & tribenuron
4 - MCPA
(Refer to page 38)

These products are prepackaged tank mix of *Refine SG* (page 270) and *MCPA ester* (page 212). Information listed is restricted to Crop, Weeds and Rates and Tank mixes. For other detailed information on the component products see the product pages listed above.

Company:

E. I. duPont Canada (*Refine M*)
Viterra (*BroadSide*)

Formulation:

***Refine SG* (PCP#28285):** 33.35% thifensulfuron methyl + 16.65% tribenuron methyl; formulated as a water soluble granule.
Container size - 8 x 121 g water soluble packets.

-plus-

***MCPA ester* (PCP#26161):** 500g/ L MCPA formulated as an emulsifiable concentrate.
Container size - 2x 9.1 L of *MCPA ester*.
-or-
***MCPA ester* (PCP# 27803):** 600g/ L MCPA formulated as an emulsifiable concentrate.
Container size - 2x 7.6 L of *MCPA ester*.

Crops and Staging:

Barley, wheat (including durum and winter) and oat from full 3 leaf to the flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions

Weeds and Staging:

Weeds Controlled or Suppressed by *Refine SG* plus 'Susceptible Weeds' controlled by MCPA ester, plus:

Dandelion (rosettes, less than 15 cm in diameter)

Volunteer canola (2 to 4 leaf) (including CLEARFIELD varieties)

Rate:

***Refine SG* :** 12 g per acre
***MCPA Ester*:** (500 g per L) - 0.23 L per acre, (600 g per L) - 0.19 L per acre
(One case treats 80 acres)

Refer to the product labels for complete mixing instructions. A general guide to mixing can be found on page 13.

Tank Mixes:

Herbicides:

In spring wheat (including durum)
Horizon 280 EC (95 mL/acre) plus *Score* adjuvant

In spring wheat (including durum) and barley:
Assert (0.54 to 0.67 L/acre)
Puma^{120} *Super* (0.16 or 0.31 L/acre)

In spring wheat (NOT durum) and barley:
Axial 100EC (243 mL/acre) plus *Adigor* adjuvant
Lontrel 360 (85 mL/acre)

Check the above tank mix partners respective labels for additional staging and varietal restrictions.

Note: The above mixes are those listed on the *Refine SG* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

See component products for more information on restrictions application details and handling. Use the most limiting restrictions of each component.

Titanium

This product is the equivalent of a prepackaged tankmix of tralkoxydim (page 278) and bromoxynil/2,4-D ester (page 112). Information listed is restricted to Crop, Weeds and Rates. For other detailed information on the component products see the product pages listed above.

Herbicide Group
1 - tralkoxydim
4 - 2,4-D
6 - bromoxynil
(Refer to page 38)

Company:

Nufarm Agriculture Inc.

Formulation:

Titanium contains 3 components:
***Achieve Liquid* (PCP# 27011):** 400 g/L tralkoxydim formulated as a suspension concentrate.
Container size - 4 L, 90 L

***Approve* (PCP# 28123):** 225 g/L bromoxynil and 225 g/L 2,4-D ester formulated as an emulsifiable concentrate.
Container size - 10 L, 2x112.5 L

***Turbocharge* adjuvant: (PCP# 23135):**
Container size - 4 L, 90 L

Crops and Staging:

Spring wheat (including durum) and barley in the 4 leaf to early flag leaf stage of the crop

Weeds and Staging:

Grass weeds: Same weeds and staging as *tralkoxydim* plus;
Broadleaf weeds: Same weeds and staging as *bromoxynil/2,4-D ester*

Rates:

Achieve Liquid: 0.2 L per acre

Approve: 0.5 L per acre

Turbocharge: 0.5 L per 100 L of spray solution

(One case treats 20 acres)

If water analysis shows bicarbonate level are 400 ppm or greater, add ammonium sulfate at 0.75 to 1.5 kg per 100 L of water.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Effects of Growing Conditions:

Crop Safety: Applications of *Titanium* to non-tillered crops exposed to 4°C temperatures before or after spraying should be avoided to prevent the possibility of crop injury. Tillered cereal crops may incur injury if *Titanium* is sprayed within 48 hours of freezing temperatures.

Restrictions:

Aerial Application: May be applied by air.

Apply using application details that are common to for both the component products and adhere to the most stringent restrictions of each

Tordon 22K

Herbicide Group
4 - picloram
(Refer to page 38)

Company:

Dow AgroSciences (PCP#9005)

Formulation:

240 g/L picloram acid present as a potassium salt, formulated as a solution.

Container size - 10 L, 3.6 L

Note: Available only through selected retail outlets.

Crop and Staging:

Apply at any stage of permanent grass pastures, rangeland and non-cropland.

NOTE: It is strongly recommended that this product be applied by a licensed applicator.

Weeds, Rates and Staging:

For the control of biennial and deep-rooted perennial weeds listed below:

Weed	Rate L/Acre	Backpack (mL of Tordon 22K per 100 M²)*
Scentless chamomile	0.445	11
Knapweed (diffuse, spotted)	0.91	22
Canada thistle, pasture sage, poverty weed, Russian knapweed, perennial sow-thistle	1.8	45
Leafy spurge, field bindweed, toadflax	3.6†	90†

† NOTE: This rate is only registered for use with hand application equipment (wand or backpack) and only one acre of every two may be treated in this manner at this rate.

* mix with 18 litres of water and the spray solution over 100 square metres.

For best results, applications should be made when perennial weeds have fully developed, green leaves. Application in late summer (or periods of dry weather) when plants are not actively growing may result in unsatisfactory control.

Application Information:

Water Volume: 160 to 325 L per acre without spray running off foliage.

Nozzles and Pressure: Maximum 150 to 350 kPa (20 to 50 psi) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of application equipment and pressure that is designed to deliver an even coverage of coarse droplets that are not prone to drift. Non-target broadleaf plants are very sensitive to *Tordon 22K* drift.

Avoid conditions that are conducive to drift. (See page 12 for drift control suggestions)

How it Works:

Tordon 22K interferes with cell division, causing leaf cupping, stem distortion and eventual death. *Tordon 22K* is absorbed through the leaves and roots.

IMPORTANT: *Tordon 22K* is a very persistent and water-soluble herbicide. Treated soil should NOT be moved from the treated area. DO NOT apply to soils that are permeable, have sinkholes, or lie over limestone bedrock. DO NOT apply to soils whose surfaces are composed of fractured rock or unconsolidated gravel. Application to these sites may allow the movement of herbicide to underlying water sources or aquifers. If shallow aquifers are present, DO NOT apply *Tordon 22K*. This product is moderately toxic to fish. DO NOT apply to any water bodies or in areas where the runoff from treated areas will reach fish-bearing waters.

Tordon 22K must not be applied on range and pasture acres that are irrigated. DO NOT compost or mulch clippings from grass treated with *Tordon 22K*.

Effects of Growing Conditions:

Avoid application when pasture and target weeds are under stress from drought, flooding, extreme heat or cold, as injury to grass or unacceptable control may result. Avoid spraying if temperatures exceed 28°C.

Tank Mixes:

None registered.

Restrictions:

Rainfall: Rain within 6 hours of application may cause poor results. Heavy rainfall may dissolve and carry *Tordon 22K* away from the target area, or it may leach dissolved *Tordon 22K* out of the root zone or to undesirable locations.

Grazing: DO NOT graze lactating dairy animals within 6 weeks after treatment. There are no grazing restrictions for other livestock. DO NOT use manure from animals grazing treated forage to fertilize susceptible plants or crops.

Re-cropping: *Tordon 22K* may persist in the soil for up to 5 years. For this reason *Tordon 22K* may only be applied on permanent grass pastures and rangeland unless applied by an authorized pesticide applicator. Avoid the root zone of desirable trees or shrubs.

Aerial Application: DO NOT apply by air.

Storage: DO NOT freeze.

Buffer Zones:
Hand-held or backpack sprayer and spot treatment DO NOT require a buffer zone from sensitive habitat, but efforts should be made to minimize exposure to sensitive plants and open water or wetlands.

Application method	Buffer Zones (metres[†]) Required for the Protection of:	
	Aquatic Habitats	Terrestrial habitat
Ground only	1	120

See the key to product pages on page 27 for an explanation of the different habitats.

[*] These distances can be reduced by 30% using cones on individual nozzles and by 70% using a full shield (shroud, curtain) that extends to the crop canopy.

[†] Distance is measured from the downwind edge of the boom to sensitive areas.

Tank Cleaning:

Tordon 22K can cause severe injury to sensitive crops (especially pulses and other broadleaf crops) at very low concentrations. Spray equipment should be flushed out immediately after spraying *Tordon 22K*. The manufacturer recommends that equipment should be flushed twice with a water/household ammonia rinse (1 L of 3% ammonia per 100 L of water). All nozzles screens and filters should be removed and cleaned after use. Do not clean equipment upslope of water bodies or ditches near crop-land or shelterbelts.

Refer to page 14 for additional information.

Hazard Rating:

Caution – Poison.

Danger – Eye Irritant.

May Cause Skin Irritation.

For an explanation of the symbols used here see page 11.

Tralkoxydim

Herbicide Group
1 - tralkoxydim
(Refer to page 38)

Company:

Dow AgroSciences (*Liquid Achieve* - PCP#28555; *Turbocharge* adjuvant - PCP#28554)
MANA Canada (*Bison* - PCP#29256;
Addit adjuvant - PCP#29263)
Viterra (*Marengo* - PCP#29289;
Turbocharge B adjuvant - PCP#29288)

Formulation:

400 g / L tralkoxydim formulated as a suspension concentrate.

Container sizes: various. Contact manufacturers.

Turbocharge and *Addit* adjuvants sold separately.

Crops and Staging:

No staging restrictions unless otherwise indicated.

Cereals:

- Barley
- Rye (spring & fall)
- Triticale
- Wheat (spring, durum, & winter)

Forage legumes: May be used on wheat and barley crops undersown to the following (if not tank mixed with a broadleaf herbicide).

- Alfalfa
- Bird's-foot trefoil
- Clovers
- Sanfoin

Forage Grasses (seed production only)*:
Under-seeded with a cereal or grown alone (seedling or established)*:

- Bromegrass (meadow, smooth)
- Creeping red fescue
- Wheatgrass (crested, intermediate)

Under-seeded with a cereal or grown alone (seedling only)*:

Wheatgrass (northern, slender, western)

* *Liquid Achieve and Bison only. NOTE - Since applications to these crops have been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance.* ***Applications to these crops is at the risk of the user.***

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Wild oats - 1 to 6 leaf stage (total leaves including tillers), with a maximum of 2 tillers.

Volunteer tame oats - 1 to 6 leaf stage.

Green and yellow foxtail - 1 to 5 leaf stage (total leaves including tillers), with a maximum of 1 tiller.

Barnyard grass, Persian darnel - 1 to 4 leaf stage (total leaves including tillers).

For forage grasses and perennial cereal rye, apply prior to tillering of the above weeds.

Apply at the 2 to 3 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are removed before tillering.

Rates:

0.2 L per acre. One 8 L jug of *tralkoxydim* treats 40 acres.

Add *Turbocharge* or *Addit* adjuvant at a rate of 0.5 L per 100 L spray solution. *Turbocharge* and *Addit* adjuvants are sold separately.

If water analysis shows bicarbonate levels are 400 ppm or greater, add ammonium sulphate at 0.9 to 1.8 kg per 100 L of spray water prior to mixing.

Refer to the product label for complete mixing instructions.

A general guide to mixing can be found on page 13

Application Information:

Water Volume:
Ground: 20 to 40 L per acre. Application in less than 20 L per acre water volume may result in mixing problems or unacceptable crop injury.
Aerial: 12 to 18 L per acre.

Nozzles and Pressure:

Ground: 40 psi (275 kPa) when using conventional 80° or 110° flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Consult with herbicide manufacturers regarding the suitability of low drift nozzles for use with these products.All strainer and nozzle screens must be 50 mesh or coarser.

Aerial: 20 to 40 psi (140 to 275 kPa)

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Cereal crops that have set tillers may incur injury (yellowing and/or stunting) if applications are made within 48 hours of freezing temperatures. Cereal crops that have not set tillers may be injured if exposed to temperatures of 4ºC or less up to 48 hours before or after application. Tank mixing with a broadleaf weed herbicide under adverse conditions may increase severity of crop injury. Crops under stress from foliar diseases or low fertility are more susceptible to injury from application. Temporary crop injury may occur when tralkoxydim tank mixes (particularly dichloprop/2,4-D ester products, and bromoxynil/MCPA ester products + additional *MCPA* Ester) are applied under extreme environmental conditions (dry or wet, cool or hot weather) resulting in crop stress. Control of grasses could be reduced when they are stressed due to drought, heat, lack of fertility, flooding or prolonged cool temperatures.

Tank Mixes:

For all tank mixes with tralkoxydim products, add *Turbocharge* or *Addit* adjuvant at a rate of 0.5 L per 100 L of spray solution.

Herbicides:

DO NOT tank mix tralkoxydim products with a broadleaf herbicide when applying to underseeded forage grasses or legumes.

	CROPS						
Tank mix Partner	**Spring wheat**	**Durum**	**Winter wheat**	**Barley**	**Spring rye**	**Fall rye**	**Triticale**
2,4-D ester (0.36 L/acre)†	•	•	•	•	•	•	
Bromoxynil†† (0.4 L/acre)	•	•	•***	•		•***	•***
Bromoxynil/MCPA Ester††† (0.4 L/acre)*	•	•	•	•		•	
Curtail M (0.81 L/acre)	•	•		•			
Dichlorprop/2,4-D (0.71 L/acre)*	•	•	•	•			
Lontrel (0.11 L/acre) + *MCPA ester* (0.45 L/acre)	•	•		•			
MCPA ester (0.45 L/acre)	•	•	•	•	•	•	
Thumper (0.40 L/acre)*	•	•		•			
Trophy (20 acres/case)	•	•		•			

† 600 g/L formulations.

†† *Pardner* only for *Liquid Achieve* and *Marengo.*

††† *Buctril M* only for *Marengo; Buctril M* and *Mextrol 450M* only for *Liquid Achieve.*

* Tank mixes may result in some temporary initial injury under adverse environmental conditions.

** Temporary crop injury can occur if applied prior to the 4 leaf stage. A reduction in wild oat control may occur with this mix.

*** *Buctril M* mixed with either *Liquid Achieve* or *Marengo* only in winter wheat, fall rye and triticale.

DO NOT tank mix tralkoxydim products with herbicides or formulations of herbicides not listed above as loss of grass control may result.

When applying broadleaf herbicides not listed above, in the same field, always apply tralkoxydim first. Apply the broadleaf product no sooner than seven days after application of tralkoxydim.

Fertilizers: None registered.

Insecticides:

Matador (49 mL/acre) (*Bison* and *Marengo* only).

Matador tank mixes with *Bison* may also be combined with bromoxynil or bromoxynil/MCPA ester products.

Fungicides: None registered.

Note: The above mixes are those listed on the *tralkoxydim* labels only. To check for other possible registered mixes see the blue chart inside the back cover.

Various manufacturers may also support additional mixes that are not on the *tralkoxydim* labels. Check with manufacturers for more details.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 1 hour will reduce control.

Grazing: Straw from treated grain crops may be fed to livestock. Immature cereal crops may be grazed or cut for hay 16 days after treatment. DO NOT feed or graze forage crops in year of treatment

Preharvest: Leave 60 days from application to harvest.

Re-cropping: DO NOT replant treated areas to tame oats or corn for at least 4 weeks after application.

Aerial Application: May be applied by air to cereal crops only. DO NOT apply within 50 m of fish bearing waters and wildlife habitat.

Storage: Store in a dry place. DO NOT freeze.

Buffer Zones: DO NOT apply within 15 m by ground (50 m by air) of fish bearing waters, wetlands and wildlife habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

⚠ Caution – Skin and Eye Irritant

For an explanation of the symbols used here see page 11.

Traxos

Herbicide Group
1 - pinoxaden and clodinafop
(Refer to page 38)

Company:

Syngenta Canada

Formulation:

25 g/L pinoxaden and 25 g/L clodinafop propargyl formulated as an emulsifiable concentrate.

Container size - 2 X 10 L, 80 L, 400 L.

Crops and Staging:

Spring wheat (including durum) - prior to the emergence of the 4th tiller.

When tank mixing, check broadleaf product description for additional restrictions.

Weeds, Rates and Staging,

0.5 L per acre, no additional adjuvant required (packages treat 40 and 160 acres). Maximum one application of this product or those with the same ingredients in a season.

For control of:

WEED	STAGE
Barnyard grass, Persian darnel	1 to 5 leaves prior to tillering
Green and yellow foxtail	1 to 5 leaves, maximum 2 tillers
Volunteer canaryseed, Volunteer oats, wild oats, proso (Crown) millet	1 to 6 leaves, maximum 3 tillers

Optimum yield response occurs when weeds are controlled in early stages.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume:

Ground – Minimum 20 L up to 40 L per acre.
*Aerial** – Minimum 12 L/acre.

Nozzles and Pressure: 40 to 45 psi (275 to 310 kPa) when using conventional 80° or 110° flat fan stainless steel nozzles tilted forward at an angle of 45°. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE coarse*** droplets.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Warm, moist growing conditions promote active weed growth and enhance activity. Weeds hardened off by environmental stress such as cold weather, drought or excessive heat may not be adequately controlled.

Tank Mixes:

Herbicides:

*Buctril M** (label rates)
Curtail M (0.6 to 0.81 L/acre)
Infinity (0.33 L/acre)
MCPA 600 ester (0.28 to 0.37 L/acre)
Mextrol 450M (0.5 L/acre)
Pulsar (80 acres / case)
Pulsar (80 acres / case) + *MCPA 600 ester* (0.23 L/acre)
Trophy (20 acres per case)

Refer to the broadleaf herbicide label for crop staging, and other information.

Fertilizers: None registered.

Insecticides: *Matador* (25 to 33 mL/acre).

Fungicides: *Tilt* (0.1 L* to 0.2 L/acre).

* Aerial application approved.

Note: The above mixes are those listed on the *Traxos* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Syngenta also supports the following mixes that are not on the Traxos label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides: *Attain XC* (low label rate), *Barricade II, OcTTain. thifensulfuron/tribenuron + MCPA, Retain, Stellar*

Fungicides: *Propel, Quilt*

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 1 hour may reduce control.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze or harvest treated crops for forage within 7 days of application.

Preharvest: Leave at least 60 days from application to harvest.

Re-cropping: No restrictions in the year following treatment.

Storage: Store in a cool, dry, ventilated are away from food or feed. Avoid ignition sources. If frozen, thaw and shake well before using.

Aerial Application: May be applied by air.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground	1	0	1
Aerial by airplane or helicopter	1	0	15

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

⚠ Warning – Skin Irritant

For an explanation of the symbols used here see page 11.

Tribenuron

Herbicide Group
2 - tribenuron
(Refer to page 38)

Company:

E. I. duPont Canada (*Express SG*)
Nufarm Agriculture (*Spike sold as Spike-Up*)
Cheminova (*Nuance*)
Viterra (*FirstStep sold as FirstStep Complete*)

Formulation:

Express SG **(PCP#28262):** 50% tribenuron methyl, formulated as a water soluble granule (WSG).

***FristStep*† (PCP#29569), *Nuance* (PCP#29468), *Spike*† (PCP#29653):** 75% tribenuron methyl, formulated as a water dispersible granule (WDG).

Container sizes:

*Express SG**: 486 g .

*Nuance**: 320 g.

† ***FirstStep* and *Spike***: Sold only as a prepackaged mix with the manufacture's glyphosate brand (see 'Company' section).

* *Express SG* and *Nuance* are purchased alone but must be used in a mix with either *2,4-D ester* (*Nuance* only) or *glyphosate* before use.

Crops and Staging:

Tribenuron + glyphosate: 24 hours prior to seeding:

Alfalfa†
Alsike clover†
Barley
Canary seed†
Dry beans†
Fababeans†
Lupins†
Oat†
Peas†
Red clover† (forage and seed production)
Summerfallow
Soybeans†
Wheat (spring, durum, winter†)

NOTE: Injury to pulse crops may occur on coarse-textured soils, low in organic matter (less than 3%), or in fields with variable soils, gravely areas, sandy areas or eroded knolls. Avoid planting pulse crops in soils containing more than 50% sand.

Tribenuron + 2,4-D ester:
Summerfallow*
Wheat (spring and durum), barley** - 3 leaf up to emergence of the flag leaf.

Express SG*† plus *non-ionic surfactant:
Post-emergent in rangeland and pasture – stage according to weeds.

***Express SG*† plus *Hasten NT adjuvant*:**
Tribenuron tolerant sunflowers (eg. *ExpressSun SU7* variety) – 2 to 8 leaves.

† *Express SG* only

* *Express SG* and *Nuance* only.

** *Nuance* only

Weeds, Rates and Staging,

Pre-seeding application and summerfallow mixed with glyphosate◊:
Express SG ***at 6 g per acre or 75%WDG tribenuron formulations at 4 g per acre plus glyphosate (any brand) at 180 g ae per acre (0.5 L per acre at a 360 g per L formulation - see* glyphosate *pages for equivalent rates for other formulations.)***
Weeds controlled by glyphosate products at the rates above plus:

Canada thistle rosettes**
Cow cockle *
Dandelion (up to 6 inches)
Narrow-leaved hawk's beard
Scentless chamomileΔ**
White cockle (rosettes)Δ**
Volunteer canola (including glyphosate tolerant varieties)***

Summerfallow◊

***Express* SG 6 g per acre or *Nuance* at 4 g per acre plus 2,4-*D ester* 170 g (6 oz.) ae per acre (i.e. 0.24 L per acre LV 700 formulation):**
Weeds controlled by 2,4-D ester at 0.24 L per acre plus:

Flixweed◊◊
Stinkweed◊◊

Post-emergent in barley and spring wheat (including durum):
Nuance ***only at 4 g per acre plus*** **2,4-D ester** ***170 g (6 oz.) active ingredient per acre (i.e. 0.24 L per acre LV 700 formulation);***
Weeds controlled by *2,4-D* plus the following weeds up to 4 inches (10 cm) unless otherwise indicated:

Annual sunflower
Canada thistle (top growth)
Cow cockle
Redroot pigweed
Wild buckwheat (1 to 3 leaf)**

Post-emergent in Rangeland and Pasture:
At the early bud – pre-bloom stage apply;
Express SG ***only at 6 g per acre◊◊◊ for season-long control of;***

Tall buttercup
Narrow-leaved hawk's-beard

Express SG ***only at 12 g per acre◊◊◊ for season-long control of;***
The weeds listed above plus:

Dandelion
Common tansy
White cockle

Post-emergent in Tribenuron Tolerant Sunflowers:
Express SG ***only at 6 g per acre (one 486 g package of*** **Express SG** ***treats 80 acres) plus*** **Hasten NT** ***adjuvant at 0.5L per 100L of spray solution will control;***

Lamb's-quarters (up to 9 leaf)
Wild buckwheat** (up to 6 leaf)

Δ *Express SG* only.
* Up to the 3 leaf stage
** Suppression only
*** Up to 6 inches
◊ Allow 10 days between treatment and tillage.
◊◊ Fall rosettes and spring seedlings.
◊◊◊ Addition of a non-ionic surfactant at 0.2L per 100L of spray solution is required.

Tribenuron may degrade if left in the sprayer for an extended period. ***Apply within 24 hours of mixing.***

Refer to the product label for complete mixing instructions.

A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 22 to 40 L per acre.

Nozzles and Pressure: Use appropriate pressure for nozzle. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE medium*** droplets or larger. Use a 50 mesh or coarser screen and filter system.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Warm, moist growing conditions promote active weed growth and enhance the activity of *tribenuron*. Weeds hardened off by environmental stress such as cold weather, drought or excessive heat may not be adequately controlled.

Tank Mixes:

Herbicides:
Prior to seeding registered crops (all products):
Must be mixed with glyphosate.

Summerfallow (Express SG and Nuance only):
Must be mixed with either *glyphosate* or *2,4-D ester.*

In spring wheat (including durum) and barley (Nuance only):
Assert (0.53 to 0.65 L/acre).
Puma^{120} Super (0.155 L/acre -green foxtail rate only)

In spring wheat (NOT durum) and barley (Nuance only):
Banvel II (44.5 mL/acre)

Tribenuron Tolerant Sunflowers (*Express SG* only):
*Clethodim** (77 mL/acre) plus *Amigo* adjuvant
Poast Ultra (0.19 L/acre) plus *Hasten* adjuvant
* *Select, Centurion* or *Shadow RTM* only

Insecticides: None registered.

Fungicides: None registered.

Fertilizers: None registered.

Note: The above mixes are those listed on the *tribenuron* labels only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check product labels for directions.

General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 6 hours will reduce control.

Re-entry: Wait at least 12 hours before entering treated fields.

Grazing:
Nuance: DO NOT graze treated crops within 30 days of application.
Express SG: Forage may be grazed immediately following application.

Preharvest Interval:
Nuance: Leave 60 days between spraying and harvest of cereals.
Express SG: Leave 70 days between spraying and harvest of sunflower.

Re-Cropping: There are no restrictions one year after treatment.

FirstStep, Nuance, Spike: Canola, flax, lentils and alfalfa may be planted 2 months after an application of *Nuance, Spike* and *FirstStep*.

Express SG: Canola, flax, and lentils may be planted 2 months after application.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool, dry place. May be frozen.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Fallow, preseed, range and pasture	1	0	4
Tribenuron tolerant sunflowers	0	0	3

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

Handheld or backpack sprayers do not require a buffer zone.

Tank Cleaning:

Tribenuron can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray *Tribenuron* should be flushed out immediately after use. The product label recommends that the sprayer, including booms and nozzles, be first flushed with clean water. Inspect the tank to ensure removal of all visible herbicide residue. If residue is observed flush again with clean water. Refill the tank with clean water and then add a household ammonia rinse (a minimum of 3% ammonia) at a rate of 1 L of ammonia per 100 L of water. Flush the ammonia solution through the tank, booms and hoses, and then add more water to completely fill the tank. Allow this solution to sit in the tank for 15 minutes while agitating. Drain the tank. **This ammonia rinse process should be done twice for the WDG formulations.** Remove nozzles and screens to be hand cleaned separately in a bucket of cleaning agent and water. Thoroughly rinse the tank with clean water for a minimum of 5 minutes. Flush water through the hoses and boom. DO NOT clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk. See product label for more detailed cleaning instructions. For additional information on tank cleaning see page 14.

Hazard Rating:

***Express SG, FirstStep* and *Spike*:**

⚠ Warning – Eye Irritant
Potential Skin Sensitizer

Nuance

▽ Caution – Eye and skin irritant

All products:

⚠ Warning - Contains the allergens milk and sulfites

For an explanation of the symbols used here see page 11.

Trifluralin

Herbicide Group
3 - trifluralin
(Refer to page 38)

Company:

Dow AgroSciences (*Treflan*)
Nufarm Agriculture (*Rival*)
United Agri Products (*Bonanza*)

Formulation:

***Bonanza 480 EC* (PCP#28289):** 480 g/L trifluralin formulated as an emulsifiable concentrate in 9.45 L, 205 L containers.

***Bonanza 10G* (PCP#22744):** 10% trifluralin formulated as a granular in 22.7 kg, 500 kg bags.

***Rival EC* (PCP#18612):** 500 g/L trifluralin formulated as an emulsifiable concentrate in 9 L, 110 L, 200 L, and 900 L containers.

***Rival 10G* (PCP#18926):** 10% trifluralin formulated as a granular in 22.7 kg, 567 kg bags.

***Treflan EC* (PCP#23933):** 480 g/L trifluralin formulated as an emulsifiable concentrate in 9.45 L, 115 L containers.

Crops and Staging:

Certain formulations are not registered for all the crops listed here. Refer to the specific product label for details. All products are for pre-plant incorporated use only.

Summerfallow use in the brown soil zone of Saskatchewan (Granular products only): Spring wheat (including durum).

Not for use in Manitoba.

Apply to summerfallow in May, June, or July for weed control during both years of a fallow-wheat rotation or in the fall (September or October) or spring prior to wheat seeding.

DO NOT apply to stubble when the previous crop was treated with another trifluralin product (*Treflan, Rival* or *Bonanza*). This includes application the previous summer or fall. DO NOT apply trifluralin to stubble or fallow when the previous year's crop was an oilseed, barley or pulse crop treated with a deep incorporated, spring or fall applied trifluralin product.

Green and Yellow Foxtail Control in Cereals:

Liquids applied in spring only (after seeding but prior to crop emergence) - spring wheat (including durum), barley.

Granulars applied in fall only (after September 1 but before freeze-up) - spring wheat (including semi-dwarf and durum).

Broadleaf and Grassy Weed Control in other crops:

Spring applied liquid or granular formulations:

Canola, peas, sunflowers, safflower (liquid formulations), dry beans, mustard, fababeans, alfalfa, sainfoin, sweet clover, soybeans, forage legumes (cicer milk-vetch, seedling alsike clover, red clover, bird's-foot trefoil).

Fall applied granular formulations: Canola, peas, sunflowers, dry beans, mustard, fababeans, soybeans, barley, lentils and flax.

Trifluralin liquids only: prior to planting shelterbelt transplants (elm, caragana, green ash, Scots pine).

Weeds:

Summerfallow use in the brown soil zone of Saskatchewan (Granular products only):
Fallow Year:

Barnyard grass
Cow cockle
Green foxtail
Lamb's-quarters
Persian darnel
Redroot pigweed
Russian thistle*
Wild buckwheat
Wild oat†

Crop Year:

Green foxtail
Lamb's-quarters
Wild buckwheat *
Wild oat *

* Suppression only

Green and Yellow Foxtail Control in Cereals:
Foxtail (green and yellow)

Broadleaf and Grassy Weed Control in other crops:

Annual brome species
  (downy, Japanese)
Barnyard grass
Chickweed
Cow cockle
Green foxtail
Knotweed
Lamb's-quarters
Persian darnel
Pigweed
Purslane
Wild buckwheat*
Wild oats†*
Yellow foxtail

* Some plants may escape herbicide treatment but are not competitive with the crop.
† Suppression with *Treflan EC* and only.

Rates and Staging:

Summerfallow use in the brown soil zone of Saskatchewan (Granular products only):
DO NOT apply to sandy soils with less than 1% organic matter. Application to severely eroded knolls is not recommended. DO NOT apply to wet soils, soils in poor working condition, soils which contain more than 8 percent organic matter, or soils subject to prolonged periods of flooding.

Granules may be applied to standing or pre-worked stubble, provided trash or green growth does not interfere with cultivation (prevent soil mixing).

Over-application caused by overlapping, improper calibration or non-uniform application may result in reduced crop stand, delayed development or reduced yields.

	RATE (KG/ACRE)	
Soil Organic Matter (%)	**1 to 3**	**4 to 8**
May	3.85	4.5
June	3.25	3.85
July	2.65	3.25
	2 to 8% Organic Matter	
September to October	2.23*	

* Control of green foxtail only, on soils between 2 to 8% organic matter.

During the fallow year, susceptible weeds may not be fully controlled until after the second fallow operation has established a uniform layer of treated soil. Control of wild oats in the crop year may be variable depending on wild oat population as well as soil and climatic conditions. Some wild buckwheat may escape but its growth will be retarded and result in limited competition to the wheat crop.

Pre-emergent control of green and yellow foxtail.

Liquids

PRODUCT	RATES (L/ACRE)	
	LIGHT AND MEDIUM SOIL TEXTURE	**HEAVY SOIL TEXTURE**
Rival EC	0.49 to 0.57 L	0.65 L
Treflan EC, Bonanza 480 EC	0.49 L	0.69 L

Granulars products (wheat only)

Rival 10G/*Bonanza* 10G at 2.23 kg per acre in all soil textures with 2 to 8 % organic matter.

Broadleaf and Grassy Weed Control in other crops:
For use in canola, peas, sunflowers, dry beans, mustard, fababeans, seedling alfalfa (spring only), seedling sweet clover (spring only), soybeans.

	SOIL TYPE			
	Light soils with less than 6% organic matter		**Medium to heavy soils with 6 to 15% organic matter**	
PRODUCT	**Spring**	**Fall**	**Spring**	**Fall**
Rival EC	0.65 L/acre	0.89 L/acre*	0.89 -1.13 L/acre	1.13 -1.37 L/acre*
Rival 10G	3.43 kg/acre**	4.45 kg/acre	4.45 -5.67 kg/acre**	5.67 -6.88 kg/acre
Treflan EC	0.69 L/acre	0.93 L/acre*	0.93 -1.21 L/acre	1.21 -1.37 L/acre*
Bonanza 10G	Not registered	4.45 kg/acre	Not registered	5.67 -6.88 kg/acre
Bonanza 480 EC	0.69 L/acre	0.93 L/acre*	0.93 L/acre	1.17 L/acre*

* Although liquid formulations are registered for fall application, this use is not recommended as tillage requirements before and after application will predispose fields to erosion.

** Spring applications of granular formulations are recommended for Manitoba only.

For use in barley (fall only), apply:

PRODUCT	SOIL TYPE					
	2 to 4% organic matter		4 to 6% organic matter		6 to 10% organic matter	
	Light Soil Texture*	Medium to Heavy Soil Texture**	Light Soil Texture*	Medium to Heavy Soil Texture**	Light Soil Texture*	Medium to Heavy Soil Texture**
Rival 10G, Bonanza 10G	3.44 kg/acre	3.44 kg/acre	4.45 kg/acre	4.45 kg/acre	4.45 kg/acre	5.67 kg/acre

* Light textured soils can be defined as sandy to sandy-loam.
** Medium to Heavy textured soils can be defined as loam to clay.

For use in flax or lentils (fall only), apply:

PRODUCT	SOIL TYPE			
	Soils with 2 to 6% organic matter		Soils with 6 to 15% organic matter	
	Light Soil Texture*	Medium-Heavy Soil Texture**	Light Soil Texture*	Medium-Heavy Soil Texture**
Rival 10G, Bonanza 10G	4.45 kg/acre	4.45 to 5.6 kg/acre***	5.67 kg/acre	5.67 to 6.88 kg/acre
Bonanza 480 EC	0.93 L/acre	0.93 L/acre	1.17 L/acre	1.17 L/acre
Treflan EC	0.93 L/acre	1.21 L/acre	1.21 L/acre	1.21 - 1.38 L/acre
Rival EC	0.89 L/acre	1.13 L/acre	0.89 L/acre	1.13 - 1.38 L/acre

* Light textured soils can be defined as Sandy to Sandy-loam.
** Medium to Heavy textured soils can be defined as loam to clay.
*** Rates vary among products. Refer to product label for specific information.

Application:

Liquid Formulations:

Water Volume: Minimum 40 L per acre.

Nozzles and Pressure: Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE medium*** droplets or larger. Use 50 mesh or coarser filter screens for DF products.

Dry Granular Formulations: Use equipment capable of metering granular herbicides and applying in an even layer over the surface of the soil. Close applicator lid after filling to avoid prolonged exposure to direct sunlight.

Incorporation:

Summerfallow use in the brown soil zone of Saskatchewan:

Apply granules to the soil surface and incorporate immediately, in the same operation if possible. DO NOT delay incorporation more than 24 hours after application. Use a deep tillage cultivator, field cultivator or disc implement set to work 2 to 3 inches (5 to 8 cm) deep, and operating at 8 to 10 km/hr. Granules should not be incorporated when soil is crusted, lumpy or too wet for good mixing action.

May - July: A second incorporation at the same depth and at an angle to the first should be done when weed growth requires it. Wait at least one week before making the second incorporation. After completing two fallow incorporations, additional operations with a rod weeder, shallow tillage or fall 2,4-D application may be required to control remaining weed growth.

September - October: A second incorporation may be done in the fall a minimum of 3 days later. Alternatively, to conserve trash cover through the winter, the second incorporation can be completed in the spring at the same depth and at an angle to the first incorporation. When both incorporations take place in the fall, shallow spring tillage should be completed in the spring. If a discer or air seeder is used for seeding, separate spring tillage may not be necessary.

NOTE: Fall application is not recommended on soils where a lack of trash cover combined with the required incorporation would leave the soil vulnerable to erosion.

Spring (In the year of seeding): Apply granules and incorporate immediately, in the same operation if possible. DO NOT delay the first incorporation longer than 24 hours after application. The second incorporation must be delayed a minimum of 3 days following the first incorporation. When applied to cold soils, wait 14 days before making second incorporation.

The second incorporation should be done at an angle to the first incorporation, and at the same depth. If a discer or air seeder is used for seeding, the seeding operation can be used as the second incorporation.

Green and Yellow Foxtail control in Cereals:

Liquid formulations: Apply and incorporate in spring just after seeding. Incorporate to a depth of 1 to 1.5 inches (2 to 4 cm) into a trash free soil (80 percent black when viewed from above) using diamond or tine type harrows operated at a speed of 6 mph (9 km/h). Incorporate twice, with the second incorporation at right angles to the first. The first incorporation should be performed immediately in the same direction of application. Both incorporations should be done within 24 hours of application. When tank mixing liquid formulations with *Avadex BW*, follow the same incorporation procedure.

Granular formulations: May be applied to standing or pre-worked stubble. Very heavy trash fields should be worked prior to application to allow product penetration to the soil surface. Incorporate with cultivators or disc implements only. Perform the first tillage operation within 24 hours of application. Incorporate at a working speed of 5 to 8 mph (8 to 13 km/hr) and to a depth of 2 to 3 inches (5 to 8 cm). Wait a minimum of 5 days, then incorporate a second time at right angles to the first. This second incorporation may be delayed until the following spring. Subsequent working should be no deeper than 2 to 3 inches (5 to 8 cm).

Broadleaf and Grassy Weed Control in other crops:

Granular formulations are recommended for use in fall or spring as a pre-plant incorporated treatment on broadleaf crops listed on the product label. The liquid formulations should be used only on soils free of lumps and relatively trash-free (75% black) and are recommended only for spring use. Granular formulations may be applied to standing or pre-worked stubble. Very heavy trash fields should be worked prior to application to allow product penetration to the soil surface. DO NOT use liquid or formulations of trifluralin as a pre-plant incorporated treatment in barley, as severe injury will result. Only the fall applications of *Rival 10G*, and *Bonanza 10G* are registered for use as pre-plant incorporated treatments in barley. For fall application of granular formulations, work the chemical into the soil between September 1 and freeze-up. Use a discer or field cultivator (vibrating shank-type). Disc implements are preferred on stubble. Set equipment to cut at 3 to 4 inches (8 to 10 cm) depth. The initial incorporation should be done within 24 hours of application.

The second incorporation should be done at right angles to the first. The second incorporation may be delayed until spring, except when planting barley, flax or lentils; for these crops both incorporations must be done in fall. Delay the second incorporation 5 days for better weed control. This will allow greater release of the chemical onto soil particles and assure more even distribution. Fall application of granular trifluralin on flax, lentils or barley is not recommended on soils prone to erosion, as the 2 fall incorporations necessary in these crops may leave soils vulnerable to wind or water erosion.

For spring application of liquid and granular formulations, work the chemical into the soil prior to seeding by setting the implement at 3 to 4 inches (8 to 10 cm) cutting depth. The first incorporation must be done within 24 hours of application. The second incorporation must be done at right angles to the first. If incorporating granular trifluralin, delay the second incorporation for 3 days after the first to achieve better weed control.

Seeding:

Summerfallow use in the brown soil zone of Saskatchewan: Allow soil to warm before seeding to reduce risk of injury to crop. Place seed 1.25 to 2.5 inches (3 to 6 cm) deep. If spring seedbed preparation is required, set cultivator 2 inches (5 cm) deep. To reduce the risk of wheat injury, use good quality seed and agronomic practices that will promote good growing conditions. Avoid deep seeding, loose seedbeds and seeding into cold soils. If extended dry periods were present after a fallow application, a 10 percent increase in seeding rate is recommended.

How it Works:

Refer to Table 2 on page 40.

Effects of Growing Conditions:

Prolonged drought conditions after a May-July application to fallow may result in higher levels of trifluralin in the soil at the time of seeding.

Injury to flax, barley, wheat or lentils may occur if soil and weather conditions are not conducive to rapid crop emergence (cold or dry soils at the time of seeding and crop emergence).

To minimize crop injury, seed into a firm, moist seed bed. Use a press drill or hoe-drill. Sow barley no deeper than 2 inches (5 cm). Sow cereals, lentils and flax no deeper than 1.5 inches (4 cm).

Less than acceptable weed control will result if dry conditions prevail at the time of weed emergence.

Rainfall has no direct effect on products' activity. Flooding (3 to 5 days) will cause rapid breakdown of the product resulting in reduced weed control. Flooding for 3 weeks or more will result in total breakdown of the product resulting in loss of weed control.

Tank Mixes:

Herbicides:
Soybeans:
Sencor (*Treflan EC* only).

Fertilizers: Liquid product may be applied with liquid fertilizer as a carrier. Before the herbicide is added to the tank, compatibility of the herbicide to liquid fertilizer should be tested following instructions on the herbicide container. *Trifluralin* liquids may be blended with dry bulk fertilizers (DO NOT mix with nitrate fertilizers). Check label for blending instructions.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *Trifluralin* labels only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No restriction. Flooding may reduce weed control.

Re-entry: Wait at least 12 hours before entering treated fields.

Grazing: DO NOT graze the treated crops or cut for feed prior to crop maturity.

Re-cropping: Oats, canaryseed, and small-seeded grasses may be affected the year after treatment. Corn is sensitive at higher rates of application. Damage to wheat can occur if the crop is seeded into land that has been treated during the previous 21 months with trifluralin products and has received abnormally low amounts of precipitation. Damage is worse if conditions are not conducive to rapid emergence of the wheat (for example, if the crop is seeded deep or if soil conditions remain cool during emergence). Damage tends to be greater on fields treated with granular formulations.

Aerial Application: DO NOT apply by air.

Storage: Granular formulations must be stored in a cool, dry location, out of sunlight.

Rival EC: DO NOT store below 5°C.

Treflan EC: DO NOT freeze.

Bonanza 480 EC: DO NOT freeze.

Recommendations for liquid formulations: Crystallization of the active ingredient may occur at less than 5°C. To reconstitute, bring temperature to 15°C and shake well until no crystals are visible. This should be done before adding to the spray tank.

Buffer Zones: (liquid formulations only)

CROP	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Field crops	80	10	1
Shelterbelts, woody crops	120	20	1

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Bonanza 480 EC:

☠ Warning – Poison

⚠ Warning – Eye and Skin Irritant

All products:

Potential skin sensitizer.

For an explanation of the symbols used here see page 10

Triton C

Herbicide Group

2 - thifensulfuron & tribenuron
4 - quinclorac
(Refer to page 38)

Company:

E. I. du Pont Canada Inc. (PCP# 28622)

Formulation:

51.55 % quinclorac + 10.30 % thifensulfuron methyl + 5.15 % tribenuron methyl formulated as a water dispersible granule.

Container size - 1.566 kg container.

Crops and Staging:

Spring barley, wheat (including durum, and spring) - 2 to 5 leaf stage.

DO NOT use on Leger barley or Belvedere wheat. When tank mixing, always check the tank mix partner recommendations for additional staging restrictions

Weeds and Staging:

Unless otherwise noted below, apply to young and actively growing weeds that are less than 4 inches (10 cm) in height or width.

Weeds Controlled:

Annual smartweed (green smartweed, lady's-thumb)
Ball mustard
Chickweed (1 to 6 leaf)
Cleavers (1 to 4 whorls)
Common groundsel
Corn spurry
Cow cockle
Flixweed
Hemp-nettle
Kochia[†]
Lamb's-quarters
Narrow-leaved hawk's-beard
Redroot pigweed
Round-leaf mallow (2 to 6 leaf)
Russian thistle
Shepherd's-purse
Sow-thistle, annual
Stinkweed
Stork's-bill (2 to 6 leaves)
Tartary buckwheat
Volunteer canola (not CLEARFIELD varieties)
Volunteer sunflowers
Wild buckwheat (1 to 5 leaf)
Wild mustard

[†] ***NOTE:*** *Surveys of fields with kochia have found that roughly 90% of these kochia populations were resistant to Group 2 herbicides. Without testing that confirms otherwise, assume that kochia in your field is likely resistant as well and is unlikely to be controlled by* Triton C *alone.*

Weeds Suppressed:

Canada thistle, perennial sow-thistle (less than 6 inches (15 cm) tall or across and prior to budding)
Scentless chamomile
Toadflax (less than 6 inches or 15 cm tall)
Volunteer flax

Rate:

39.25 g per acre. Limit to one application of this product or other products containing the same ingredients per year.

(One 1.566 kg container treats 40 acres)

***Merge adjuvant* (not included) must be added at 1.0 L per 100 L of spray solution.**

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: Minimum 22 L per acre.

Nozzles and Pressure: 30 to 40 psi (210 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE medium*** droplets. Use a 50 mesh or coarser screen and filter system.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

DO NOT apply to wheat, or barley that are stressed by severe weather conditions (frost, drought or water saturated soil) as crop injury may result. Under certain conditions (heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures) lightening in crop colour and reduction in crop height may occur.

Group 2 susceptible kochia control may be reduced during stress conditions or if extremely heavy infestations exist.

Tank Mixes:

DO NOT mix with substances that contain boron or that release chlorine.

Herbicides:

In spring wheat (including durum) and barley only;
Puma^{120} *Super* (0.31 L/acre - up to 4 leaf stage only for barley)*.

In spring wheat (NOT including durum) and barley only;
Axial 100EC (0.24 L/acre) plus *Adigor* adjuvant*.
Axial 100EC (0.24 L/acre) + *MCPA ester* (0.19 L/acre)** plus *Adigor**

In spring wheat (including durum) only;
Horizon 240EC (93 mL/acre) plus *Score* adjuvant*.

In spring wheat (NOT including durum) only;
Everest 70WDG (8.7 to 17.4 g/acre)* †
Everest 70WDG (8.7 to 17.4 g/acre) plus *2,4-D Amine*** (0.28 L/acre)* †

* *Merge* adjuvant is NOT required with this mix.

** 600 g/L formulation

† Requires the addition of a non-ionic surfactant as per tank mix partner recommendations.

Fertilizers: None registered.

Note: The above mixes are those listed on the *Triton C* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 6 hours may reduce control in general.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: Must not be grazed or fed to livestock for 77 days after treatment or 80 days after applying the mix of *Triton C* + *Puma*^{120} *Super* to barley.

Preharvest Interval: Leave 77 days between treatment and harvest for wheat and durum and 80 days for barley.

Re-cropping: Spring wheat (including durum) and spring barley may be reseeded immediately following application. Wheat, barley, oats, canola, field peas, flax, lentil and sunflowers may be grown the year after application. On low organic matter soils or under dry conditions, flax and lentils should NOT be grown until the second year after application. DO NOT use *Triton C* on land where potatoes or vegetables are grown. A field bioassay (a test strip grown to maturity) must be conducted the year before growing any crops other than those listed above.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool, dry place. May be frozen.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	0	15

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Triton C can cause severe injury to sensitive crops at very low concentrations. Sprayers should be flushed out immediately after use. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/ ammonia rinse (1L of 3% ammonia per 100 L of water). All nozzles, screens and filters should be removed and cleaned after applying this product. Rinse the tank, booms, hoses, and nozzles with clean water to complete the process. DO NOT clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

☠ Caution – Poison

⚠ Warning – Eye and Skin Irritant
Potential Skin Sensitizer

For an explanation of the symbols used here see page 11.

Triton K

Herbicide Group
2 - tribenuron
4 - dicamba
(Refer to page 38)

Company:

E. I. duPont Canada

Formulation:

Triton K package contains the following components:

***Express SG* (PCP#28606)*:** 50% tribenuron methyl formulated as a water soluble granule.
Container size - 243 g bottle.

Plus

***Banvel II* (PCP#23957)*:** 480 g/L dicamba diglycolamine salt, formulated as a solution.
Container size - 1.8 L

-or-

***DB-858* (PCP#28872): *Triton Broadleaf* (PCP# 29989):** 58.45% dicamba sodium salt, and 8.25% tribenuron methyl formulated as a water dispersible granule.
Container size - 1.47 kg

-Plus-

Both versions contain:

2,4-D LV 700 (PCP#23192): 660 g/L 2,4-D ester formulated as an emulsifiable concentrate.

* *The original formulation of* Triton K *is a tank mix of* Express SG *(page 271),* 2,4-D ester *(page 62) and* Banvel II *(page 121). This formulation is no longer being manufactured, but supplies still remain in the distribution system. The older formulation will be removed from future editions of this publication when supplies are exhausted.*

Crops and Staging:

Spring wheat (including durum), winter wheat and barley:

3 leaves fully expanded to 6 leaves plus 3 tillers. Application outside of this stage range can result in injury to the crop.

Summer-fallow: Stage according to weeds.

* ***DB-858* / *Triton Broadleaf* only.**

Weeds and Staging:

Weeds controlled up to 10 cm tall or across:

Annual sunflower
Ball mustard
Canada thistle (top growth control)
Cow cockle
Dandelion ***
Flixweed**
Hare's-ear mustard
Indian mustard
Kochia, including Group 2 resistant biotypes (2 to 10 leaf)†
Lamb's-quarters
Narrow-leaved hawk's-beard**
Prickly lettuce
Redroot pigweed
Russian pigweed
Russian thistle
Shepherd's-purse**
Stinkweed**
Sweet clover
Thyme-leaved spurge
Tumble mustard
Wild buckwheat*
Wild mustard
Wild radish
Wormseed mustard

* 1 to 4 leaf stage
** Fall rosettes and spring seedlings only.
*** Spring or fall rosettes up to 15 cm in diameter.
† *NOTE: Surveys of fields with kochia have found that roughly 90% of these kochia populations were resistant to Group 2 herbicides. Without testing that confirms otherwise, assume that kochia in your field is likely resistant as well.*

Rate:

Depending on formulation available add either:

Express SG: 6 g per acre, and;
Banvel II: 44.5 mL per acre

-or-

***DB-858/Triton Broadleaf*:** 36.8 g per acre

Plus with either of the options above add:
2,4-D 700 LV ester: 243 mL per acre

(One package treats 40 acres or 16 ha)

Apply this product or other products containing the same ingredients only once per season.

Triton K may degrade if left in the sprayer for an extended period of time. Apply with in 24 hours of first mixing. Refer to the product label for complete mixing instructions.

A general guide to mixing can be found on page 14.

Application Information:

DO NOT apply if temperatures are greater than 30ºC, if humidity is high, or wind is blowing toward non-target plants as injury from drift may result.

Water Volume: Minimum 22 L per acre.

Nozzles and Pressure: Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE coarse*** droplets. Use a 50 mesh or coarser screen and filter system

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

DO NOT apply to wheat, or barley that are stressed by severe weather conditions (frost, drought or water saturated soil) as crop injury may result. Under certain conditions (heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures) lightening in crop colour and reduction in crop height may occur.

Kochia control may be reduced during stress conditions or if extremely heavy infestations exist.

Tank Mixes:

Herbicides:

In spring wheat (including durum), winter wheat* and barley only;

Puma^{120} *Super* (0.16 L/acre - green foxtail only)

** **DB-858/Triton Broadleaf only.***

In spring wheat (not durum) only;
Everest 70WDG (label rates)

Fertilizers: None registered.

Note: The above mixes are those listed on the *Triton K* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Within 4 to 6 hours may reduce control.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: Lactating dairy animals MUST NOT graze fields with 7 days of treatment.

Preharvest Interval: Leave 30 days between application and harvest.

Re-cropping: No restrictions the year following application.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool, dry place. May be frozen.

Buffer Zones:

CROP	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Cereals	1	0	4
Fallow	1	1	15

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance is measured from the downwind edge of the boom to sensitive areas.

Handheld or backpack sprayers do not require a buffer zone.

Tank Cleaning:

Triton K can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray this product should be flushed out immediately after use. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/ ammonia rinse (1L of 3% ammonia per 100 L of water). All nozzles, screens and filters should be removed and cleaned after applying this product. Rinse the tank, booms, hoses, and nozzles with clean water to complete the process. DO NOT clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

▼ Caution – Poison

◇ Warning – Eye and Skin Irritant
Potential Skin Sensitizer

For an explanation of the symbols used here see page 11.

Trophy 600

Herbicide Group
4 - fluroxypyr & MCPA
(Refer to page 38)

Company:

Nufarm Agriculture

Formulation:

The *Trophy 600* package has 2 components:

***Trophy 600 A* (PCP#29761):** 180 g/L fluroxypyr.

***Trophy 600 B* (PCP#29760):** 600 g/L MCPA ester.

Container size - *Trophy A* – 4.8 L, *Trophy B* – 7.5 L

All components above are formulated as emulsifiable concentrates.

All components above are formulated as emulsifiable concentrates.

Crops and Staging:

Spring wheat (including durum), canaryseed* & barley: - 3 leaf up to to full emergence of the flag leaf.

Since the use of this product on canaryseed is registered under the User Requested Minor Use registration system, the manufacturer assumes no responsibility for herbicide performance.* ***Users of this product on canaryseed do so at their own risk.*

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Weeds controlled at the 2 to 4 leaf stage, unless specified include:

Burdock
Cleavers (1 to 4 whorls)
Cocklebur
Flixweed
Hemp nettle (2 to 6 leaf)
Kochia
Lamb's-quarters
Mustards (except dog and tansy)
Prickly lettuce
Ragweed (common)
Redroot pigweed
Shepherd's-purse
Stinkweed
Sunflower (annual)
Vetch
Volunteer canola
Volunteer flax (1 to 12 cm)
Wild mustard
Wild radish

Weeds suppressed include:

Smartweed (green)
Stork's-bill (1 to 8 leaf)
Wild buckwheat (1 to 4 leaf)

Rate:

Trophy 600 A: 0.24 L per acre

Trophy 600 B: 0.38 L per acre.

(One case treats 20 acres)

Make only one application of this product or other products containing fluroxypyr per year.

Application Information:

Water Volume: Minimum 40 L per acre.

Nozzles and Pressure: 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE coarse*** droplets

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Trophy activity is influenced by weather conditions. The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after application may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions (drought, heat or cold stress) or if extremely heavy infestations exist.

Tank Mixes:

Herbicides:

In spring wheat (including durum) and barley:
Achieve Liquid (0.2 L/acre) plus *Turbocharge* adjuvant.
Assert (0.53 to 0.65 L/acre) plus pH adjuster.
Puma^{120} *Super* (0.31 L/acre).

In spring wheat (including durum):
Horizon 240EC (93 mL/acre) plus *Score* adjuvant.

Insecticides: None registered.

Fertilizers: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the *Trophy 600* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Re-Entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze, harvest forage or cut hay within 7 days of application. Remove meat animals from treated fields at least 3 days before slaughter.

Preharvest: Leave 60 days from application to harvest.

Re-cropping: Wheat, barley, oats, rye, forage grasses, flax, canola, mustard, lentils and peas may be grown the year after application. There are no re-cropping restrictions the second year after application.

Aerial Application: DO NOT apply by air.

Storage: May be frozen. If frozen, bring to room temperatures and agitate before use.

Buffer Zones:

Application method	Buffer Zones (metres[†]) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	15	15	15

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy. Hand-held or backpack sprayers, inter-row hooded sprayers and spot treatments are exempt from buffer zone requirements.

[†] Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Handheld or backpack applications do not require a buffer.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

☠ Danger – Poison.

◇ Warning – Eye Irritant.

▽ Caution – Skin Irritant.

For an explanation of the symbols used here see page 11.

Tundra

Herbicide Group
1 - fenoxaprop
6 - bromoxynil
27 - pyrasulfotole
(Refer to page 38)

Company:

Bayer CropScience (PCP#29367)

Formulation:

46 g/L of fenoxaprop-p-ethyl, 87.5 g/L of bromoxynil and 15.5 g/L of pyrasulfotole formulated as an emulsifiable concentrate.
Container size - 8.1 L, 129.6 L and 405 L.

Crops and Staging:

Application beyond the maximum rates provided below may result in crop injury.

CROP	STAGE
Barley, Spring wheat (including durum)	1 to 6 leaves on the main stem plus 3 tillers

Weeds and Staging:

Apply 0.81 L per acre (one 8.1 L container treats 10 acres) to control;

Grass weeds from the 1 to 6 leaf stage up to emergence of 3rd tiller:

Barnyard grass
Foxtail (green and yellow)
Wild oat

Apply at the 3 to 4 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are removed before tillering.

Broadleaf weeds from the 1 to 6 leaf stage unless otherwise indicated:

Annual sow-thistle
Chickweed
Canada thistle* (up to 30 cm)
Cleavers (1 to 6 whorls)**
Dandelion*
(up to 25 cm across†)
Flixweed (up to 10 cm)
Hemp-nettle
Kochia (up to 10 cm)
Lamb's-quarters
Pale smartweed
Perennial sow-thistle*
Ragweed (Common)
Redroot pigweed
Round leaf mallow*
Russian thistle (up to 10 cm)
Shepherd's-purse
Stinkweed
Volunteer canola***
Wild buckwheat
Wild mustard

* Suppression only

** Add ammonium sulfate at 202 g per acre (99% dry) or 0.4 L per acre (49% solution) at 4 to 6 whorls. If using an ammonium sulphate product with a different concentration, adjust the rate accordingly.

*** All herbicide tolerant varieties.

† Spring seedlings and over-wintered rosettes.

Apply this product or other products with the same ingredients only once per season.

Application Information:

Water Volume:
Ground: 18.9 L per acre. Use higher water volumes for dense crop/weed canopies.
Aerial: 11.4 L per acre.

Nozzles and Pressure: Use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE medium classification*** droplets. Low drift nozzles may require higher pressures for proper performance.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Crop injury may result if applied to a crop that is stressed by severe weather conditions, frost, low fertility, drought, water-saturated soil, disease or insect damage. Weeds growing under adverse environmental conditions such as drought will be less susceptible to Tundra. Under stressed conditions and/or heavy crop canopy, early application will result in improved weed control.

Tank Mixes:

None registered.

Bayer also supports the following mixes that are not on the *Tundra* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides: *2,4-D Ester, Lontrel, MCPA Ester.*

Fungicides: *Stratego; Tilt*

Insecticides: *Decis, Sevin XLR.*

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13

Restrictions:

Rainfall: Within 1 hour may reduce control.

Re-Entry: DO NOT enter treated areas for 12 hours.

Grazing: DO NOT graze or cut cereal crops for hay, within 25 days of application.

Preharvest Interval: Leave 65 days from application to harvest.

Re-cropping: Alfalfa, barley, canaryseed, canola, corn (Manitoba only), flax, oats, potato, soybean (Manitoba only), sunflower, tomato (Manitoba only), and wheat (spring, and durum) may be planted the season following application. Field peas may be grown the following year in all black, grey-wooded and dark brown soil zones. DO NOT plant field peas the season following *Tundra* use in the brown soil zone where organic matter content is below 2.5 % and where soil pH is above 7.5. Lentils may be seeded the second season following application.

Aerial Application: May be applied by air.

Storage: Store in a dry controlled temperature facility. DO NOT freeze. Shake before using if stored for longer than one year.

Buffer Zones:

Application method	Buffer Zones (metres) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	3	1	10
Fixed wing aircraft	10	1	375
Helicopter	10	1	225

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

▽ Caution – Poison

◎ Danger – Corrosive to eyes and skin.
Potential skin sensitizer.

◇ Warning – Eye Irritant.

For an explanation of the symbols used here see page 11.

Ultim (For use only in Manitoba)

Herbicide Group
2 - rimsulfuron & nicosulfuron
(Refer to page 38)

Company:

E. I. duPont Canada (PCP#24736)

Formulation:

37.5% rimsulfuron + 37.5% nicosulfuron formulated as a water dispersible granule.
Container sizes - 134.8 g (4 x 33.7 g water soluble bags).

Crops and Staging*:

The following field corn hybrids at the 1 to 4 leaf stage:

Pioneer Brands 39K72, 39K73, 39W54, 39M27. For use in Manitoba only.

NOTE - Since applications to corn in Manitoba has been registered under the User Requested Minor Use program, the manufacturer assumes no responsibility for herbicide performance.* ***Application to corn is at the risk of the user.*

Weeds and Staging:

No information is provided on the label for leaf staging. The manufacturer recommends the following staging:

CROP	STAGE
Wild oats	3 to 6 leaf
Foxtail (green and yellow), barnyard grass, volunteer cereals	1 to 6 leaf (up to 2 tillers)
Quackgrass	3 to 6 leaf stage (with extended leaf 4 to 8 inches long)
Redroot pigweed	2 to 6 leaf

Contact the manufacturer for additional weeds not listed on the label.

Rates:

13.5 g per acre.

One water soluble bag of *Ultim* will treat 2.5 acres (10 acres per container).

Add a non-ionic surfactant (*AgSurf, Agral 90, Citowett Plus*) at 0.2 L per 100 L of spray solution.

Apply *Ultim* within 24 hours of mixing, as product degradation may occur resulting in reduced weed control. Refer to the product label for complete mixing instructions.

Application Information:

Water Volume: Minimum 40 L per acre; for best results apply 56 to 77 L per acre.

Nozzles and Pressure: No pressures listed on label when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage of ***ASABE medium*** droplets. Use a 50 mesh or coarser screen and filter system.

Effects of Growing Conditions:

Rapid fluctuations in temperature (greater than 20°C difference within 24 to 36 hours) will stress the corn crop. For maximum crop safety, allow 48 to 72 hours for the corn to acclimatize before applying *Ultim*.

Apply ONLY when the temperature in the 24 hours before AND after application is between 5°C and 28°C. Temperatures beyond this range increase the potential for crop injury. Separate applications of *Ultim* herbicide followed by a broadleaf herbicide (minimum 12 hours later) will reduce the potential for injury.

WARNING: Crop injury may result if application is made to corn that has been stressed by abnormally hot, humid or cold weather conditions, frost, low fertility, drought, water saturated soil, compacted soil, previous pesticide applications, disease or insect damage. If corn has been injured by frost, wait 48 to 72 hours before applying *Ultim*.

Tank Mixes:

Herbicides: None registered.

Insecticides: None registered. *Ultim* ***should NOT*** be applied to corn that has been treated with *Thimet*, or *Lorsban*. Leave 7 days between the application of *Ultim* and that of a foliar organophosphate insecticide.

Fungicides: None registered.

Note: The above mixes are those listed on the *Ultim* label only. To check for other possible registered mixes see the blue fold out chart inside the back cover.

Restrictions:

Rainfall: Within 2 to 4 hours may reduce control.

Re-entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze treated crops or cut for hay.

Preharvest: Leave 30 days from application to harvest.

Re-cropping: Field corn, winter wheat and spring barley may be planted the year following application. Perform a field bioassay before planting any other crops, or where *Ultim* is more persistent (sandy soils, with low organic matter and pH greater than 7).

Aerial Application: DO NOT apply by air.

Storage: Store product in original containers in a secure, dry area, away from other pesticides, food, or feed.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground only*	1	1	5

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Drain tank and hose down interior surfaces. Flush tank, hoses, boom, and nozzles with clean water for a minimum of 5 minutes. Fill spray tank with a water-ammonia cleaning solution (1 litre of minimum 3% household ammonia for every 100 L of water). Flush hoses, boom and nozzles with the cleaning solution, then add more water to completely fill the tank. Circulate for 15 minutes, then flush hoses, boom and nozzles with the cleaning solution, and drain the tank. Remove and clean the nozzles and screens separately in a bucket containing a cleaning solution as above. Repeat the above process and then thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing the water through the hoses and boom. Prior to using the sprayer for the next application, flush the tank, boom and hoses for 5 minutes with fresh water. Do not clean equipment where cleaning solution could flow towards water bodies, ditches, cropland, shelterbelts, or areas where people are likely to frequent or walk.

For additional information, Refer to page 15.

Hazard Rating:

◇ Warning – Eye Irritant.

▽ Caution – Skin Irritant.

For an explanation of the symbols used here see page 11.

Varro

Herbicide Group
2 - thiencarbazone
(Refer to page 38)

Company:

Bayer CropScience (PCP#29070)

Formulation:

10 g/L thiencarbazone-methyl formulated as a suspension concentrate.

Container size - 4 L jug.

Crops and Staging:

Spring wheat (including durum):

1 to 6 leaf stage to a maximum of 3 tillers, and before the first node can be felt in the stem.

Winter wheat:

Spring or fall application from 1 to 6 leaf stage and before the first node can be felt in the main stem.

DO NOT apply after the presence of the first node as crop injury may occur.

Weeds and Staging:

Grass weeds controlled from 1 to 6 main stem leaves and prior to the emergence of the 3rd tiller unless otherwise indicated:

Barnyard grass
Foxtail (green and yellow†)
Japanese brome† **
Persian darnel†
Volunteer Canaryseed *
Wild oats

Broadleaf weeds controlled at the 1 to 6 leaf stage unless otherwise indicated:

Cleavers (1 to 6 whorls)
Hemp-nettle
Lamb's-quarters†
Pale smartweed
Pigweed, redroot
Round-leaved mallow†
Russian thistle (up to 10 cm)†
Shepherd's-purse
Stinkweed
Volunteer canola
(except Clearfield varieties)
Wild buckwheat
Wild mustard

* Up to the emergence of the 2nd tiller.

** Prior to tillering.

† Suppression only.

Rates:

0.2 L per acre

(One case will treat 40 acres)

Varro may be tank-mixed with ammonium sulphate **on spring wheat only**. Add ammonium sulphate at 202 g/acre (99% solution) or 0.4 L/acre (49% solution).

Application Information:

Water Volume:

Ground: 20 to 40 L per acre. Use higher water volumes for dense canopies.

Aerial: Minimum 11.3 L per acre.

Nozzles and Pressure:

Ground: For conventional flat fan nozzles use a pressure of 30 to 50 PSI (207 to 345 kPa). Angle nozzles forward 45 degrees for better coverage. Low drift nozzles may require higher pressures for proper performance.

Aerial: Minimum 43 PSI (300 kPa).

For either ground or aerial, use a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE medium*** droplets.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

DO NOT apply to crops or weeds that are stressed (frost, low fertility, drought or flooding, disease or insect damage) as crop injury or reduced weed control may result. DO NOT apply under conditions where the time from seeding to spraying exceeds 35 days or if temperatures will be 3°C or lower within 3 days of application (before or after).

Tank Mixes:

Herbicides:

Spring Wheat (including durum):

2,4-D ester (0.23 L/acre – 600 g/L form)
Buctril M (0.4 L/acre)
MCPA ester (0.23 L/acre – 600 g/L form)
Thumper (0.4 L/acre)

Spring Wheat (NOT including durum):
Curtail M (0.61 L/acre)
Refine SG (12 g/acre)
Refine SG + 2,4-D ester (rates above)
Refine SG + MCPA ester (rates above)

Fungicides: None registered.
Insecticides: None registered.
Fertilizers: None registered.

Note: The above mixes are those listed on the *Varro* label only. To check for other possible mixes see the blue fold out chart in the back inside cover of the guide.
Bayer CropScience also supports the following mixes that are not on the *Varro* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides: *Attain XC, OcTTain, Prestige XC.*

All tank-mixes are applicable to spring wheat and durum. When tank-mixing *Varro* with *Prestige XC* or *Curtail M* in spring wheat always add Ammonium Sulphate.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 14.

Restrictions:

Rainfall: Rain within 1 hour of application may reduce control.

Re-Entry: DO NOT enter treated field for 12 hours.

Grazing: Must not be grazed within 7 days or cut for livestock feed within 30 days of treatment.

Preharvest Interval: DO NOT harvest grain or straw within 60 days of application for spring and durum wheat or within 72 days of application to winter wheat.

Re-cropping: Alfalfa, barley, canaryseed, canola, chickpeas, dry bean, field corn, flax, lentils, mustard, oat, peas, soybeans (Manitoba only), sunflower, timothy, and wheat (durum, spring) may be seeded the year following application.

Aerial Application: May be applied by air.

Storage: Store in a cool, dry place. Keep from freezing. Shake well before using.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	0	1
Fixed wing aircraft	1	0	30
Helicopter	1	0	30

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

⚠ Warning – Eye and Skin Irritant.

For an explanation of the symbols used here see page 11.

Velocity m3

Herbicide Group
2 - thiencarbazone
6 - bromoxynil
27 - pyrasulfotole
(Refer to page 38)

Company:

Bayer CropScience

Formulation:

Velocity m3 All-In-One **(PCP=29584):** 5g/L thiencarbazone-methyl, 31.3g/L pyrasulfotole and 175 g/L bromoxynil formulated as a suspension concentrate
Container size - 8.1 L and 129.6 L.

Crops and Staging*:

Spring wheat (including durum):
1 to 6 leaf stage to a maximum of 3 tillers, and before the first node can be felt in the stem.

Winter wheat:
Spring or fall from 1 to 6 leaf stage and before the first node can be felt in the main stem.

* DO NOT apply after the first node as crop injury may occur.

Weeds and Staging:

Grass weeds controlled from 1 to 6 main stem leaves and prior to the emergence of the 3rd tiller:

Barnyard grass
Foxtail (green and yellow†)
Canaryseed
Persian darnel†
Wild oat
Japanese brome†

Broadleaf weeds controlled at the 1 to 6 leaf stage unless otherwise indicated:

Canada thistle (up to 30 cm)†
Common chickweed
Cleavers (1 to 6 whorls)
Dandelion (up to 25 cm diameter)†
Flixweed (up to 10 cm)
Hemp-nettle
Kochia (up to 10 cm)
Lamb's-quarters
Pale smartweed
Pigweed, redroot
Ragweed, Common
Round-leaved mallow
Russian thistle (up to 10 cm)
Shepherd's-purse
Sow-thistle (annual, perennial†)
Stinkweed
Volunteer canola (all varieties)
Wild buckwheat
Wild mustard

† Suppression only.

Under challenging weed populations, staging or environmental conditions the addition of ammonium sulphate to Velocity m3 can provide more consistent weed control.

Rates:

0.4 L per acre

(One 129.6 L drum will treat 320 acres)

Application Information:

Water Volume:
Ground: 20 to 40 L per acre. Use higher water volumes for dense canopies.
Aerial: Minimum 11.4 L per acre.

Nozzles and Pressure:
Ground: For conventional flat fan nozzles use a pressure of 30 to 50 PSI (207 to 345 kPa). Angle nozzles forward 45 degrees for better coverage. Low drift nozzles may require higher pressures for proper performance.
Aerial: Minimum 43 PSI (300 kPa).

For either ground or aerial, use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

DO NOT apply to crops or weeds that are stressed (frost, low fertility, drought or flooding, disease or insect damage) as crop injury or reduced weed control may result.

Tank Mixes:

None registered.

Velocity m3 may be tank-mixed with ammonium sulphate on spring wheat only. Add ammonium sulphate at 202 g/ acre (99% solution) or 0.4 L/acre (49% solution) or 0.5L/ acre (40% solution).

***Bayer* also supports the following mixes that are not on the *Velocity m3* label. Apply mixes according to the most restrictive use limitations for either product:**

Herbicides: *2,4-D Ester* (56-112 g ai/acre), *Lontrel*, *MCPA Ester* (56-112 g ai/acre).

When adding *2,4-D Ester* or *MCPA Ester* to *Velocity m3* tank-mix, ammonium sulphate may also be added.

Fungicides: *Stratego; Tilt*

Insecticides: *Decis, Sevin XLR.*

Restrictions:

Rainfall: Within 1 hour may reduce control.

Re-Entry: DO NOT enter treated field for 24 hours.

Preharvest: DO NOT harvest grain or straw within 60 days of application to spring and durum wheat or within 72 days of application to winter wheat.

Grazing: Must not be cut for livestock feed within 30 days or grazed by livestock within 25 days of treating the crop.

Re-cropping: Alfalfa, barley, canaryseed, canola, field corn (Manitoba only), flax, soybeans (Manitoba only), tame oat, and wheat (durum, spring) may be seeded the year following application. Field peas may be grown the following year in all black, grey-wooded and dark brown soil zones. DO NOT plant field peas the season following Velocity m3 use in the brown soil zone where organic matter content is below 2.5 % and where soil pH is above 7.5. Lentils may be seeded the second season after application.

Aerial Application: May be applied by air.

Storage: Store in a cool, dry place. Keep from freezing. This product is combustible. DO NOT store near heat or open flame.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	1	5
Fixed wing airplane	10	1	375
Helicopter	10	1	225

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Velocity m3 tankmix:

Warning – Poison

Warning – Eye and Skin Irritant.

Caution – Contains the allergen soy.

Velocity m3 All-In-One:

Warning – Poison

Danger – Corrosive to eyes.
Skin Irritant
Potential Skin Sensitizer

For an explanation of the symbols used here see page 11.

Velpar DF

Herbicide Group
5 - hexazinone
(Refer to page 38)

Company:

E. I. duPont Canada (PCP#25225)

Formulation:

75% hexazinone formulated as a water dispersible granule Container size - 2 kg.

Crops and Staging:

Established alfalfa for forage and seed. Apply in late fall prior to freeze-up when alfalfa is dormant or in early spring before alfalfa growth resumes. Apply only on alfalfa that has been established for 18 months or longer. If burning or irrigation is to be carried out, do not apply until these operations have been completed.

NOTE: DO NOT apply to frozen ground. DO NOT apply to soils with less than 1% organic matter. DO NOT apply to gravelly or rocky soils, exposed subsoils or sand. Crop injury may occur in fields where alfalfa root growth has been restricted by hard pans or other physical barriers to root growth.

Weeds, Rates and Staging:

Application stage is dictated by the crop above.

Apply a minimum of 0.272 kg per acre to control:

Dandelion	Quackgrass
Sow-thistle	

Apply 0.544 kg per acre to control:
The weeds above plus:

Narrow-leaved hawk's-beard	Scentless chamomile

Use the lower rate on medium-textured soils with low organic matter.

Application Information:

Water Volume: 81 L per acre.

Nozzles and Pressure: 30 to 40 psi (200 to 275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage with *ASABE medium* droplets.

How it Works:

Refer to Table 2 on page 36.

Effects of Growing Conditions:

Adequate soil moisture is required for activation of the product.

Tank Mixes:

None registered.

Restrictions:

Rainfall: Rainfall is beneficial for activation of the product.

Re-Entry: DO NOT re-enter treated fields for 48 hours.

Grazing: Leave 30 days between application and grazing harvesting for feed (hay or greenfeed).

Re-cropping: Leave 2 years of between treating alfalfa and the seeding of a crop. A field bioassay is required after 2 years to determine which crops are safe to grow.

Aerial Application: DO NOT apply by air.

Storage: May be frozen.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	1	1	5

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Handheld or backpack sprayers do not require a buffer zone.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Danger – Corrosive to eyes.

Caution – Poison

Caution – Skin Irritant

For an explanation of the symbols used here see page 11.

Viper*/Viper ADV

Herbicide Group
2 - imazamox
6 - bentazon
(Refer to page 38)

Company:

BASF Canada (*Viper, Viper ADV*)

Formulation:

* *Note:* Viper *is changing from a co-packaged product to a formulated product. The old formulation of* Viper *is no longer manufactured, but some supplies may still remain in the distribution system. This product is being replaced by the new formulation* Viper ADV.

*Viper** contains:

***Viper A* (PCP#30214):** 70% imazamox as a water dispersible granule.
Container size - 4 x 117 g water soluble bags.

***Viper B* (PCP#30215):** 480 g/L bentazon formulated as a solution.
Container size - 2 x 7.23 L.

-or-

Viper ADV contains:

***Viper ADV* (PCP#30626)**: 20 g/L imazamox and 429 g/L bentazon formulated as a solution.
Container size: 2 x 9.5 L.

Both products require the addition of:

BASF 28% UAN (28-0-0) is required, but sold separately.
Container size - 2 x (2 x 8 Liters); 128 L drums.

Crops and Staging:

Field peas: 3 to 6 above-ground nodes (3 to 6 true leaves).

Note: Use of either of the *Viper* formulations under hot, humid conditions may result in temporary leaf yellowing, leaf flecking, bronzing or burning. The crop usually outgrows this condition within 10 days and new tissues will not be affected.

Weeds and Staging:

Grasses - 1 to 4 main stem leaves or until early tillering.

Barnyard grass
Green foxtail
Japanese brome*
Persian darnel
Volunteer barley
Volunteer canaryseed
Tame oat
Volunteer wheat (including durum, not CLEARFIELD varieties)
Wild oat
Yellow foxtail

Broadleaf Weeds - cotyledon to 4 leaf stage.

Cleavers* †
Cow cockle
Green smartweed
Kochia*†
Lamb's–quarters
Redroot pigweed
Round leaf mallow*
Russian Thistle
Shepherd's-purse
Stinkweed
Volunteer canola (including CLEARFIELD varieties)
Volunteer lentils (including CLEARFIELD lentils)
Wild buckwheat*
Wild mustard†

* Suppression only.

† Including Group 2 resistant biotypes.

Rates:

When Using *Viper*:
Viper A: 11.7 g per acre
Viper B: 0.36 L per acre

When using *Viper ADV*:
400 ml per acre

(One case of either *Viper* or *Viper ADV* treats 40 acres)

Both products require the addition of **28 % *BASF UAN*** (sold separately) at 0.81 L per acre.

Failure to include UAN will result in significantly reduced product performance.

DO NOT use any other adjuvants with *Viper* as injury may result.

DO NOT apply *Viper/Viper ADV* more than once or follow *Viper/Viper ADV* with any related products (*Basagran, Odyssey, Solo*) in the same year.

DO NOT apply *Viper/Viper ADV* to any crop other than field peas as severe injury will result.

Refer to the product label for complete mixing instructions for this product.

A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 40 L per acre. High water volumes are required for adequate coverage, particularly when weed densities are high or weed staging is large.

Nozzles and Pressure: Use 40 psi (275 kPa) when using conventional flat fan nozzles. Low drift nozzles may require higher pressures for proper performance. Use a combination of nozzles and pressure designed to deliver thorough, even coverage a of ***ASABE medium*** droplets. Use 50 mesh (or coarser) filter screens.

Effects of Growing Conditions:

DO NOT spray if temperatures of +5°C or less are forecast within 3 days of application. Under cool or dry conditions, control of some weeds may be severely reduced. DO NOT apply to crops stressed from hail damage, flooding, drought, hot, humid weather, widely fluctuating temperatures, prolonged cold or injury from previous herbicides, as crop injury may result.

Tank Mixes:

None registered.

Restrictions:

Rainfall: Rain within 6 hours may reduce control.

Re-Entry: DO NOT enter treated fields for at least 12 hours.

Grazing: DO NOT graze or cut for feed.

Preharvest Interval: DO NOT apply within 60 days of harvest.

Re-cropping: Winter wheat may be seeded 3 months after application. Barley, canaryseed, canola, chickpea, field corn, field pea, flax, lentil, oat, sunflower, and spring wheat (including durum) may be seeded the first season after application and tame mustard (condiment types only) the second season after application. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above.

Contact manufacturer for additional information on recropping intervals.

Aerial Application: DO NOT apply by air.

Storage: DO NOT freeze. Store in a cool, dry place above 5°C.

Buffer Zones: Avoid spraying in situations where drift may occur. Leave at least 11 metres between the outside edge of the sprayed area and sensitive non-target areas such as shelterbelts, hedgerows, wetlands, woodlots, vegetated ditch banks, ponds, streams, and sloughs. Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

Warning – Poison

Danger – Corrosive to eyes (*Viper B* only).

Warning – Contains the allergen soy.

Warning – Eye and Skin Irritant.

For an explanation of the symbols used here see page 11.

Plant Disease Control

Integrated Plant Disease Management

Cereal Leaf Diseases

Cereal leaf diseases affect both the yield and quality of cereals. The following management practices are recommended for effective control of leaf diseases in all cereal crops.

Scouting: Scout fields prior to, during, and following flag leaf emergence to check for disease levels. Flag and upper leaves are responsible for 50 per cent or more of grain-fill.

Crop Rotation: Rotate crop types [e.g. cereal (wheat)/oilseed/cereal(barley)/pulse] to reduce the build-up of disease inoculum in crop residue. If at all possible, do not seed the same crop in back to back years. When a short rotation is absolutely necessary, seed in the second year a variety that is more resistant to an anticipated disease problem.

Resistant Varieties: Provincial crop/seed guides provide a comprehensive listing of the performance of adapted varieties, including their resistance status to specific diseases.

Foliar Fungicides: Foliar fungicides, applied at the proper time in accordance to manufacturers' Pesticide Product labels, can control cereal leaf diseases and help to attain target yields. The greatest benefit occurs when disease pressure is high or with varieties that have poor resistance.

Spraying Practices: Foliar fungicides should be applied preventively, before disease is well-established in a crop and already causing crop loss. Good spray coverage with minimal drift is essential. Ideally, the best time to spray is when the wind is light, humidity is above 60 per cent and air temperature is between 10 and 25°C

Ergot of Cereals

Ergot is a fungal disease that affects most cereals and grasses in Canada. Ergot bodies contain toxic alkaloids; they should never be consumed by humans or fed to animals. Ergot is a particularly damaging disease of rye, and has also been observed sporadically over the years on wheat, durum, and triticale in the prairie provinces, with elevated levels reported in 1999, 2005, 2008, and 2011. After an ergot outbreak, crop residue and soil become contaminated with a higher load of ergot bodies, placing nearby grasses and cereal crops at greater risk of infection in the following seasons. This risk increases further when cool, moist weather conditions promote ergot spore production and/or when cereals experience an extended period of flowering or an induction of floret sterility due to any of a variety of agronomic or environmental factors. Once ergot is present, little can be done to control the disease in the field, so prevention is important. Planting seed contaminated with ergot bodies can potentially spread disease to previously clean fields and there are no seed treatments registered; therefore only clean, healthy seed should be used. During the field season, nearby grasses may be mowed to remove additional hosts. Prior to harvest, fields should be scouted to determine where ergot has developed, such as headlands, and those areas should be harvested separately. Viability of ergot bodies decreases after one to two years.

Fusarium Head Blight of Cereals

Fusarium head blight (FHB) causes a reduction in yield as a result of floret sterility and the loss of light weight cereal kernels during combining. More important is the effect on grain quality and food safety due to production of mycotoxins, including deoxynivalenol (DON) and vomitoxins. In Manitoba, FHB occurs throughout all crop regions and will damage wheat crops whenever environmental conditions favour the disease. In Saskatchewan, FHB has been established in eastern regions for several years, but occurs across the province, particularly in wet years.

Field Management of FHB: Weather is by far the greatest factor in development of FHB. The disease is most likely to develop when the plants are flowering, temperatures range from 15 to 30°C and high moisture is continuous for 48 to 60 hours. If conditions remain warm and moist, the pathogen can continue to sporulate and spread to other kernels or heads. Under these optimum conditions, crop management has little impact on FHB outbreaks. Production practices, which lead to reduced tillering and shortened flowering duration, could reduce the risk period of FHB infection.

Crop Rotation and Crop Selection: A break of at least one year – preferably two years – is advised between cereal, grass and corn production. In fields of wheat on wheat stubble, the incidence of FHB was about one and a half times higher than in fields of wheat planted into pulse crop residue. Regardless of the rotation, producers should consider planting cereals that are less susceptible to FHB. Results from previous years show that durum and soft white wheat varieties are more susceptible than hard red spring wheat varieties. Barley is more resistant than wheat, and oat is more resistant than either wheat or barley. Refer to provincial seed guides for FHB disease ratings for each variety. Avoid planting the more susceptible types or varieties of wheat in high risk areas such as the southern part of the Red River Valley and southeastern Saskatchewan. Planting two or more varieties of wheat with differing flowering times or varying planting dates will help reduce the risk of infection. Susceptible crops should not be planted on infected corn stubble. Corn trash is slower to decompose than cereal trash, and acts as a source of inoculum for a much longer time period.

Late Blight of Potatoes

One of the major threats to Manitoba and Saskatchewan's potato industry is the fungal disease late blight. At present, there is no fungicide registered for use on potatoes that is capable of eradicating the fungus from infected plants. As a result, producers are forced to adopt preventive management to control this disease. One of the main components of this strategy is the application of fungicides at specified spray intervals. This interval varies with the type of fungicide used. Shortening or lengthening of this interval should be based on current weather conditions and the status of the disease in the crop.

In Manitoba, potato producers can make use of a weather-based late blight risk forecasting program. The purpose of this program is to predict when environmental conditions are most conducive to disease development and issue warnings based on those parameters.

Accurate weather monitoring and scouting techniques are very important for achieving the most effective use of fungicides. Combining precise weather forecasting with spray interval scheduling may lower input costs for the farmer and lead to a more productive, higher quality crop. These weather monitoring systems monitor key environmental variables, such as relative humidity, temperature, leaf wetness and precipitation.

The following practices are recommended for effective disease management:

Scouting: To effectively schedule preventative fungicide applications and eliminate unnecessary fungicide use, local weather forecasts should be used to identify conditions conducive to disease development. Scout fields regularly to identify diseases and pests that may be developing. Low areas in rolling or hilly fields and in wind-protected area near trees lines should be specially checked.

Crop Varieties: *(There are no known commercial resistant varieties currently available in Canada).* Where practical, the use of short season varieties may help reduce the period of use for fungicides.

Healthy Seed: Obtain seed from sources with effective disease management practices. The use of certified seed is legislated in Manitoba and Saskatchewan. Grade seed carefully while cutting and discard suspicious looking tubers and seed pieces.

Cull Clean-up: Avoid leaving tubers, including debris or slivers from seed cutting, in cull piles for any length of time. Follow a program of sanitation for storage facilities and equipment to eliminate sources of the disease. Dispose of cull piles in an approved manner so they do not serve as a source of disease inoculum for future infections. Dispose by burying, using a cover, spreading out on the field over winter, or feeding to livestock.

Sanitation: Follow a program of sanitation for storage facilities and equipment to eliminate sources of disease. Sanitation consists of cleaning and disinfecting all equipment, storage, and tools that contact potatoes from seeding through harvest and storage. Since most disinfectants are inactivated by soil and plant debris, it is essential that equipment and storage is thoroughly cleaned with a pressure washer or steam cleaner with detergent before disinfectant is applied. Treated surfaces should remain wet for at least 20 minutes for the disinfectant to destroy disease organisms.

Cultural Practices and Rotation: Use proper cultural practices including a one in four year potato crop rotation; proper hilling to reduce disease and greening in tubers; manage irrigation to avoid an excess or deficit of soil moisture; schedule irrigation throughout the day so it is not extending the natural dew period and prolonging leaf wetness; if late blight is discovered destroy hot spots of infected fields; control weed hosts (especially nightshades) and remove and destroy volunteer potatoes. Use appropriate weed control practices in rotational crops to control those weeds that may be hosts of diseases in potatoes.

Foliar Fungicides: Preventative fungicide applications are most effective in controlling late blight. Follow product label guidelines for most efficient and safe use of products. Labels of newly registered products also provide information on resistance management. In this context – medium to high risk of resistance fungicides (e.g. Group 7 - boscalid and Group 11 – stobilurins) should be rotated or mixed with low risk fungicides (e.g. mancozeb (M3) and chlorothalonil (M5)).

Farm Visits: The following recommendations are provided to prevent the spread of potato diseases from field to field or between farms. All people serving the potato industry should use these sanitary practices.

1. Contact the grower for permission to enter fields and other facilities on the farm.
2. Keep your vehicle clean and whenever possible, avoid driving your vehicle into fields or potato handling areas.
3. Carry a boot brush and a supply of disinfectant in your vehicle at all times. Quaternary ammonia (General Storage Disinfectant) is recommended as it is also registered for bacterial ring rot disinfection.
4. Wear coveralls or other protective outerwear that can be discarded or disinfected regularly.
5. Clean, washable, footwear is recommended and rubber boots are preferred.
6. Clean, wash, and disinfect your boots thoroughly on arrival at each field/farm/storage shed and before leaving.
7. Remove dirty outerwear, including boots before entering your vehicle.
8. Any tools to be used during the farm call (potato forks, shovels, soil probes, knives, etc) should be cleaned and disinfected before and after use.
9. Maintain a detailed logbook of field/farm/storage shed visits.

Canola Diseases

Sclerotinia stem rot has been one of the most prominent diseases affecting canola in Manitoba and Saskatchewan for the past 25 years. An important factor for disease development is environmental conditions. The disease is much more widespread and severe during wet years. Fungicide applications are an important element in controlling the development and spread of sclerotinia. Fungicide spray decisions are based on soil moisture, weather conditions, crop stage and density, and disease history. The sclerotinia resting bodies (sclerotia) require moist soil conditions for up to 10 days for germination to occur and the spore-bearing structures (apothecia) to form. Usually these conditions do not occur until the crop canopy closes. The spores released from the apothecia utilize the canola petals as a food source and fall into the canola canopy where they infect plants. Lesions form up and down the stem, wilting leaves and eventually killing the plant. Fungicide should be applied between the 20 to 50 per cent flower stages to protect the petals from being colonized by the spores.

Blackleg caused by *Leptosphaeria maculans* affects canola and most crucifer field and vegetable crops. After many years of low incidences, due to resistant canola varieties grown in the prairie provinces, the disease is gaining importance again. High frequency of canola in crop rotations, accompanied by changes in the pathogen populations, has led to higher incidences and severities in some fields. For an effective control, a 4 year crop rotation is highly recommended.

Clubroot is a soil-borne disease caused by a microbe, *Plasmodiophora brassicae*. Clubroot affects the roots of cruciferous field crops such as canola, mustard, and camelina, as well as cruciferous vegetables and weeds. Clubroot has become a significant problem for canola growers in some areas of Alberta and the pathogen has been detected in Saskatchewan and reported once in Manitoba. Clubroot is a regulated pest in Saskatchewan under *The Pest Control Act*. Currently there is no provincial legislation that regulates clubroot in Manitoba.

Invasion of the interior of the host roots alters hormone balance and leads to increased cell division and growth, resulting in clubroot galls. These deformed roots have a reduced ability to absorb water and nutrients leading to stunting, wilting, yellowing, premature ripening and shrivelling of seeds. The cause of these above-ground symptoms can be confirmed by digging up suspect plants to check roots for gall formation. Clubroot affects canola yield and quality to a similar degree as other diseases affecting water and nutrient uptake, and its impact depends on soil conditions and the growth stage of the crop when infection occurs. Spore germination, infection and disease development are favoured by warm soils, high soil moisture and low soil pH; however, the disease can still occur under conditions outside of the optimum parameters. Infected roots will eventually disintegrate, releasing resting spores into the soil, which may then be transported by wind, water erosion, animals/manure, shoes/clothing, vehicles/tires or earth tag on agricultural or industrial field equipment. Resting spore numbers will decline over time when non-host crops are grown, but a small proportion can survive in soil for up to 20 years. Clubroot is primarily a soil-borne disease; it does not infect seed but it may be found in soil attached to seed or other plant parts. There are currently no seed treatments or foliar fungicides registered for control of clubroot on canola. The following best practices are recommended for prevention and management of clubroot:

1. Plant susceptible crops, including resistant varieties, no more than once every four years. Although crop rotation will not prevent the introduction of clubroot to fields that are free of the pathogen, it will restrict clubroot development by limiting the increase of clubroot resting spores and preventing the increase of clubroot inoculum, as well as help alleviate the impact of other plant pathogens.
2. Scout crops regularly and carefully.
   - Identify suspicious above-ground symptoms including wilting, stunting, yellowing and premature ripening of canola or other susceptible crops.
   - Field entrances and approaches are likely to be contaminated with clubroot spores first. Therefore, symptoms will often appear there first.
   - Confirm cause of above ground symptoms by checking the roots for galls.
   - Send sample of symptomatic plants into a commercial lab for confirmation of diagnosis.
3. Practice good sanitation by restricting movement of potentially contaminated soil to non-contaminated regions.
   - For Saskatchewan and Manitoba producers, this means restricting entry into their fields of vehicles, field machinery or oil rig equipment with earth tag from infested regions unless it has been properly sanitized. Ask questions about where the equipment is from and what sanitation measures have been used before the equipment left the infested area, dealer or auction site.
   - Cleaning steps may include: removal of crop debris and soil, washing of equipment with a power washer using hot water or steam and misting with disinfectant (1-2 per cent bleach solution), followed by an additional rinse with water.
   - Other agricultural products, which could carry soil, should be carefully checked for excess soil and if possible be from clubroot free areas.

For more information on clubroot, visit www.clubroot.ca, www.agriculture.gov.sk.ca, or www.gov.mb.ca/agriculture.

Pulse Crop Diseases

There are a variety of pulse crops produced in Manitoba and Saskatchewan including field pea, field bean, lentil, chickpea and soybean. Pulse crops are adapted to different regions and will require unique agronomic and disease management practices. Some diseases will attack all pulse crops, e.g. sclerotinia (white mould) and seedling/root rots caused by *Pythium, Rhizoctonia, Fusarium* and *Botrytis* species. Some diseases may occur on more than one type of pulse crop, but the pathogen species infecting each is often specific to that crop. This is the case for the ascochyta blights, powdery mildews and anthracnose. It is important to source information on pulse disease control from grower organizations such as the Saskatchewan Pulse Growers (www.saskpulse.com), Manitoba Pulse Growers (www.manitobapulse.ca), provincial specialists, and field diagnostic guides. Most foliar diseases are favoured by warm, moist conditions and lush crop canopies, but root rots and powdery mildew can be present in dry years as well. In general, pulse disease management will need to include the following practices:

Use of clean seed and seed treatments: Plant certified seed or seed that has been tested at an accredited lab and known to have high germination and zero or acceptable levels of seed-borne disease. Seed treatments will help protect seed and seedlings from low levels of seedborne and soilborne pathogens

Crop Rotation: It is important to keep at least three years between the same type of pulse crop to allow for the breakdown of crop residue on which disease pathogens survive. Since there are diseases that affect more than one type of pulse crop, it is still important to maintain at least two years between different pulse crops.

Crop Varieties with Disease Resistance: Refer to provincial seed guides for varieties adapted to your region. When available, choose varieties with disease resistance.

Scouting and Foliar Fungicide Application: Begin crop scouting at the vegetative stages for aggressive diseases such as ascochyta blight in chickpea. Scout for other foliar diseases at early bloom, e.g. ascochyta blight and anthracnose in lentil. It is too late to apply fungicide to control sclerotinia (white mould) once symptoms are observed, and/or the canopy has closed, so forecasting to determine risk is necessary.

Use foliar fungicides only when disease risk and potential loss are significant. Rotate fungicides or use tank mixes from different fungicide groups to prevent development of resistant pathogen populations.

Effects of Weather

Do not apply foliar fungicides during periods of dead calm or when winds are gusty. Avoid application immediately after a rainfall and delay spraying if rainfall is imminent. Contact fungicides are always more sensitive to wash-off by rainfall than systemic fungicides, because their mode of action relies on drying on the leaf surface. Failure of a contact fungicide to dry on the leaf surface may result in a loss in efficacy. Systemic fungicides are less sensitive than contact fungicides, but still need sufficient drying time and fully absorbed by plants prior to rainfall. Consult the label or product manufacturers for rainfast period for individual products.

Pathogen Resistance (Insensitivity) Management

Any fungal pathogen population may contain strains naturally insensitive to a fungicide and other fungicides within the same Group. A gradual or total loss of disease control may occur over time if these fungicides are used repeatedly in the same fields. Other resistance mechanisms that are not linked to site of action but specific for individual chemicals, such as enhanced metabolism, may also exist.

To delay fungicide resistance/insensitivity:

- Where possible, rotate the use of a fungicide, (and others within the same Group) with different Groups that control the same pathogens.
- Where possible, tank mix fungicides with a high risk of developing insensitivity with other fungicides from a different Group.
- DO NOT apply more than the maximum number of applications listed on the label. Avoid consecutive sprays of a fungicide, or other fungicides in the same Group, in a season.
- Fungicide use should be based on an integrated pest management (IPM) program that includes scouting and accurate recording related to pesticide use and crop rotation. An IPM program also considers cultural, biological and other chemical control practices.
- Monitor treated fungal populations for signs of fungicide insensitivity. If disease continues to progress after treatment with a product, DO NOT increase the use rate. Discontinue use of the product and switch to another fungicide with a different target site of action.
- Contact your local regional crops specialist or certified crop advisor for any additional pesticide management and/or IPM recommendations for specific crops and disease problems in your area.

Fungicide Modes of Action

Why are fungicides needed?

- Control of disease during crop establishment.
- Increase productivity of crop (photosynthesis) and/or reduce blemishes.
  - Maintain yield and/or market value.
- Improve storage life and quality of harvested plants / grain / produce.
  - Prevent spoilage and/or production of mycotoxins.

How do fungicides work?

There are several ways to define 'mode of action':

Timing:

- Preventative: fungicide must be present on plant surface before the pathogen and repeated applications are required to protect new growth.
- Curative: pathogen may already be present (post-infection, pre-symptom kick-back activity).
- Eradicant: (post-symptomatic activity).
- Inhibitive: prevents spore germination or sporulation.

Placement:

- Contact (AKA protectant): immobile – must come in direct contact with the pathogen.
- Systemic (AKA penetrant): mobile – can move within plant.

Movement:

- Intra-plant Movement: within crop via vapour phase or redistribution by rain.
- Passive Absorption – by diffusion.
- Apoplastic Movement: xylem-mobile; move within free space and cell walls, upward through the transpiration stream (with water).
- Symplastic Movement: phloem-mobile (common characteristic of herbicides and insecticides but very few fungicides).

Spectrum:

- General, Non-specific, or Broad Spectrum: fungicide affects pathogen in multiple ways.
- Specific or Narrow Spectrum: fungicide targets a specific metabolic site in pathogen or against critical enzyme or protein. Genetic changes or naturally insensitive fungi have a greater chance to overcome the fungicidal effect (resistance/insensitivity).

Composition:

- Inorganic Fungicides: sulfur or metal ions such as copper.
- Organic Fungicides: contain carbon atoms.
- Biopesticides: suppressing pest populations using naturally occurring organisms or natural products derived from plants.

Biochemistry:

- Primary basis to classify fungicides, developed by Fungicide Resistance Action Committee (FRAC) using their general Mode of Action on fungi and their chemistry.
  - All fungicides within a group share a common mode of action and resistance mechanism.
  - Fungicides within a group may have different chemical structures.
  - Resistance management strategies required wherever resistance is known or there is a risk of resistance development
  - See Table 1.

Table 1. Fungicide Groups Based on Biochemical Mode of Action (FRAC)

Mode of Action Target	Chemical Group & Chemical Name	Resistance Risk	Foliar Fungicide Products Registered in Saskatchewan/Manitoba	Seed Treatment Products Registered in Saskatchewan/Manitoba
A. Nucleic Acid Synthesis	4. Phenyl Amides	High	_Ridomil Gold/Bravo*, Ridomil Gold SL/Bravo*, Ridomil Gold 480EC, Ridomil Gold 480SL_	_Acceleron Seed Treatment Package*, Allegiance FL, Apron Advance*, Apron Maxx RFC*, Apron Maxx RTA*, Belmont 2.7FS, Cruiser Maxx Beans*, Cruiser Maxx Cereals*, Cruiser Maxx Pulses*, Cruiser Maxx Vibrance Beans*, Cruiser Maxx Vibrance Cereals*, Dividend XL RTA*, Helix Vibrance*, Helix XTra*, Maxim Quattro*, Prosper Evergol*, Prosper FX*,Raxil MD*, Raxil WW, Trilex AL*, Vibrance XL*_
B. Mitosis & Cell Division	1. Methyl Benzimidazole Carbamates	High	_Senator 70WP_	_Apron Advance*, Crown*, DCT*, Maxim Quattro*, Mertect SC, Senator PSPT_
	22. Benzamide	Low to Medium	_Gavel 75DF*, Torrent_	None
C. Respiration	7. Carboxamides	Medium	_Headline Duo*, Lance, WDG Fungicide, Priaxor*, Vertisan_	_Crown*, Cruiser Maxx Vibrance Beans*, Cruiser Maxx Vibrance Cereals*, Gaucho CS FL*, Helix Vibrance*, Prosper Evergol*, Prosper FX*, Rancona RS, Vibrance 500S, Vibrance XL*, Vitaflo 220*, Vitaflo 280*, Vitaflo Fungicide*, Vitaflo SP Fungicide*_
	11 Strobilurins	High	_Acapela, Blanket*, Cabrio Plus*, Headline EC, Headline Duo*, MANA Azoxystrobin, Quadris, Quilt*, Priaxor*, Reason 500SC, Stratego 250EC*, Tanos 50DF*, Twinline*_	_Maxim Quattro*, Prosper Evergol*, Prosper FX*, Trilex AL*_
	21. Cyanoimidazole	Medium to High	_Ranman 400SC, Torrent 400SC_	None
	29. 2,6-Dinitroanilines	Low	_Allegro 500F_	None
	45. Triazolopyrimidylamine	Medium to High	_Zampro*_	None
D. Amino Acid & Protein Synthesis	9. Anilinopyrimidine	Medium	_Scala SC, Astound*_	None
E. Signal Transduction	2. Dicarboximides	Medium to High	_Rovral Flo, Rovral RX, Overall 240SC_	None
	12. Phenylpyrroles	Low to Medium	_Astound*_	_Acceleron Seed Treatment Package*, Apron Advance*, Apron Maxx RFC*, Apron Maxx RTA*, Cruiser Maxx Beans*, Cruiser Maxx D Potatoes*, Cruiser Maxx Pulses*, Cruiser Maxx Vibrance Beans*, Helix Vibrance*, Helix XTra*, Maxim D*, Maxim Liquid PSP, Maxim MZ PSP*, Maxim PSP, Maxim Quattro*, Proseed_

Table 1. Fungicide Groups Based on Biochemical Mode of Action (FRAC) *continued*

Mode of Action Target	Chemical Group & Chemical Name	Resistance Risk	Foliar Fungicide Products Registered in Saskatchewan/Manitoba	Seed Treatment Products Registered in Saskatchewan/Manitoba
F. Lipid / Membrane Synthesis & Cell Wall Degradation	28. Carbamates	Low to Medium	*Tattoo C**	None
	40. Carboxylic Acid Amides (CAA)	Low to Medium	*Acrobat 50WP, Revus, Zampro**	None
	44. *Bacillus* strain QST 713	Low	*Serenade ASO, Serenade Max*	None
G. Sterol Biosynthesis	3. Demethylation Inhibitors	Medium	*Blanket*, Bumper 418EC, Caramba, Folicur 432F, Folicur 250EW, Fuse, Inspire, Palliser, Pivot 418EC, Proline 480SC, Propel, Propiconazole Fungicide, Prosaro 250EC, Quash, Quilt*, Stratego 250EC*, Tilt 250E, Twinline**	*Acceleron Seed Treatment Package*, Armour, Armour RTU, Charter RTU, Cruiser Maxx Cereals*, Cruiser Maxx D Potatoes*, Cruiser Maxx Vibrance Cereals*, Dividend XL RTA*, Gemini*, Helix Vibrance*, Helix XTra*, Maxim D*, Rancona Apex, Rancona RS, Raxil MD*, Raxil T*, Raxil WW*, Vibrance XL**
U. Unknown	27. Cyanoacetamide-oximes	Low to Medium	*Curzate 60DF, Tanos 50DF**	None
	33 Phosphonates	Low	*Phostrol*	*Confine*
	NC (Not classified) and diverse	Not known	*Contans WG, Regalia Maxx*	*Acceleron DX-910, Acceleron Seed Treatment Package*, StorOx*
M. Multi-Site Contact Activity	M1. Inorganic copper	Low	*Copper* products, *Kocide 2000*	*Kocide 2000*
	M2. Inorganic sulphur		*Kumulus DF*	None
	M3. Dithiocarbamates		*Cabrio Plus*, Dithane DG Rainshield NT, Gavel 75DF*, Manzata Pro-Stick, Penncozeb 75DF, Polyram DF*	*DB-Red L, Gaucho CS FL*, Polyram 16D, Potato ST16, Raxil T*, Solan MZ, Thiram 75 WP, Tuberseal, Vitaflo 220*,Vitaflo 280*, Vitaflo Fungicide*, Vitaflo SP Fungicide**
	M4. Phthalimides		None	*Agrox B-2, Agrox CD, Agrox FL, DCT*, Gemini*, Maxim MZ PSP**
	M5. Chloronitriles		*Bravo 500, Bravo Zn, Echo 720, Echo 90DF, Ridomil Gold/Bravo*, Ridomil Gold SL/Bravo*, Tattoo C**	*None*

*Products contain more than one active ingredient and appear in more than one group.

Foliar Fungicide Tables

Table 2. Foliar Fungicides for Disease Control in Potatoes

FUNGICIDES	Page	Black Dot	Botrytis Gray Mould / Botrytis Vine Rot	Early Blight	Late Blight	Late Blight Tuber Rot	Pythium Leak	Pink Rot	Rhizoctonia Canker, Black Scurf, Stolon Canker, and Stem Rot	Silver Scuf	White mould / Sclerotinia rot
Acrobat WP	320				1	1					
Allegro 500F	321				•						
Bravo 500	326		•	•	•						
Bravo Zn	326			•	•						
Cabrio Plus	326			•	•						
Copper 53W	332			•	•						
Copper Spray	332			•	•						
Curzate 60 DF	334				1						
Dithane DG Rainshield NT	326			•	•						
Echo 90DF / Echo 720	307		•	•	•						
Gavel 75 DF	336			•	•						
Headline EC	338			•	•						
Inspire	341			•							
Kocide 2000	332			•	•						
Lance	344			•	1						
Manzate Pro-Stick	346			•	•						
Parasol WG	332			•	•						
Penncozeb 75 DF	346			•	•						
Phostrol	347				•	•	2,3				
Polyram DF	348			•	•						
Quadris	323	•		•	•				2	2	
Quash	357			•							
Ranman 400SC	359				•	•					
Reason 500SC	361			1	1						
Revus	363				•						
Revus Top	364			•	•						
Ridomil Gold / Bravo, Ridomil Gold SL / Bravo	364		•	•	•	•	3	3			
Ridomil Gold 480EC, Ridomil Gold 480SL	364							2			
Scala SC	366			1							
Serenade Max / ASO	368			3							3
Tanos 50 DF	370			•	•						
Tattoo C	371				•						
Torrent 400 SC	335				•	•					
Vertisan	376		•	3					3		
Zampro	378				•	•					

Note: Before using any pesticide on potatoes, consult the list of Agricultural Pesticides Approved for Use, available from Simplot Canada and McCain Foods (Canada).

- • Fungicide effective against the disease

1. Must not be used alone, only as a tank mix (consult individual labels)
2. In-furrow treatment (suppression only)
3. Suppression only (foliar application)

Table 3. Foliar Fungicides for Disease Control in Cereals

		CROPS						DISEASES																	
																Rusts									
FUNGICIDES	Page	Wheat (W)	Barley (B)	Oat (O)	Rye (R)	Triticale (T)	Corn (C)	Fusarium Head Blight (wheat, barley, oat, rye)**	Fusarium and Gibberella Ear Rot** (corn)	Gray Leaf Spot (corn)	Northern Leaf Blight (corn)	Southern Leaf Blight (corn)	Eye Spot (corn)	Net Blotch (barley)	Powdery Mildew (wheat, barley, oat, rye, triticale)	Common Rust (corn)	Crown Rust (oat)	Leaf Rust (wheat, barley, rye, triticale)	Stem Rust (wheat, barley, oat, triticale)	Stripe Rust (wheat, barley)	Scald (barley)	Septoria Glume Blotch (wheat)	Septoria Leaf Spot (wheat, barley, oat, rye, triticale)	Spot Blotch (wheat, barley)	Tan Spot (wheat, barley, rye, triticale)
Acapela	318	X	X	X	X	X	X				•				•			W,R,T					W,B,R,T		W
Blanket	325	X	X		X									•				W,B		•	•		W,B,R		W,B,R
Bravo 500	326	X						W														•	W		W
Bumper 418EC*	352	X	X	X			X				•			•	W,B	•	•	W,B	W,B	W	•	•	W,B,O	B	W
Caramba	327	X	X	X	X	X		•						•			•	•			•		W,O,T	•**	•
Dithane DG Rainshield NT	346	X																W					W		W
Echo 720	328	X						W														•	W		W
Folicur 432F / Folicur 250EW	372	X	X	X				W						•	W,B		•	W,B	W,B,O	•	•	•	W,B	B	W
Fuse	372	X	X	X				W						•	W,B		•	W,B	W,B,O	•	•	•	W,B	B	W
Headline EC	338	X	X	X	X		X			•				•	W,R	•	•	W,R		•	•		W	•	W
Manzate Pro-Stick	346	X																W					W		W
Palliser	372	X	X	X				W						•	W,B		•	W,B	W,B,O	•	•	•	W,B	B	W
Penncozeb 75DF	346	X																W					W		W
Pivot 418EC*	352	X	X	X			X				•			•	W,B	•	•	W,B	W,B	W	•	•	W,B,O	B	W
Proline 480SC	350	X	X	X			X	W,B	•	•	•		•	•		•	•	W			•	•	W	B	W
Propiconazole Fungicide*	352	X	X	X			X				•			•	W,B	•	•	W,B	W,B	W	•	•	W,B,O	B	W
Prosaro 250EC	355	X	X					W,B						•	W,B			W,B	W,B	•	•	•	W,B	B	W
Quadris	323						X									•									
Quilt	359	X	X				X			•	•	•	•	•		•		W,B		•	•		W,B		W
Regalia Maxx	362	X																					W**		
Stratego 250EC	369	X	X	X										•	W		•	W	W	W	•		W,B,O	B	W
Tilt 250E*	352	X	X	X			X				•			•	W,B	•	•	W,B	W,B	W	•	•	W,B,O	B	W
Twinline	375	X	X	X	X	X								•	W,R,T		•	W,R,T		•			W,T	•	W,T
Vertisan	376	X	X	X	X	X	X			•**						•		W,R,T	•				(W,B,T)**		

* Propiconazole = Bumper 418EC, Pivot 418EC, Propel, Propiconazole Fungicide and Tilt 250E

** Suppression only

X Product registered for the crop

- Fungicide registered for disease control on all crops listed unless otherwise noted by the abbreviations listed: wheat (W), barley (B), oats (O), rye (R), triticale (T)

Table 4. Foliar Fungicides for Disease Control in Specialty and Other Crops

		CROPS						DISEASES									
FUNGICIDES	Page	Alfalfa grown for seed (A)	Canaryseed (CS)	Coriander (CR)	Grasses grown for seed (G)	Sugar Beets (SB)	Timothy (TY)	Blossom Blight (A & CR)	Cercospora Leaf Spot (SB)	Common Leaf Spot (A)	Crown & Root Rots (SB)	Spring Black Stem & Leaf Spot (A)	Sclerotinia (A)	Septoria Leaf Mottle** (CS)	Leaf Rust & Stem Rust (G)	Powdery Mildew (G & SB)	Purple Eye Spot (TY)
Bumper 418EC*	352		X											•			
Caramba	327					X			•								
Dithane DG Rainshield NT	346	X								•		•					
Headline EC	338	X			X					•					•	G**	
Inspire	341					X			•							SB	
Lance	344	X						A		•		•	•				
Manzate Pro-Stick	346	X								•		•					
Overall 240SC	342	X											•				
Penncozeb 75DF	346	X								•		•					
Pivot 418EC*	352		X				X					•		•			•
Propel*	352		X				X							•			•
Propiconazole Fungicide*	352		X											•			
Quadris	323			X				CR									
Rovral Flo / Rovral RX	342	X											•				
Tilt 250E*	352		X				X							•			•
Vertisan	376					X					1					SB**	

* Propiconazole = Bumper 418EC, Pivot 418EC, Propel, Propiconazole Fungicide and Tilt 250E

** Suppression only

X Product registrered for the crop

• Fungicide registered for disease control on all crops listed unless otherwise noted by the abbreviations listed: alfalfa (A), canaryseed (CS), coriander (CR), grasses (G), sugar beets (SB), timothy (TY)

1. In-furrow treatment

Table 5. Foliar Fungicides for Disease Control in Oilseed Crops

FUNGICIDES	Page	CROPS: Canola (CA)	Flax (F) (and Crambe for Proline only)	Rapeseed, Oriental Mustard (M)	Soybean (S)	Sunflower (SF)	DISEASES: Alternaria Spot (canola, sunflower)	Anthracnose (soybean)	Blackleg (canola)	Brown Spot (soybean)	Frogeye / Cercospora Leaf Spot (soybean)	Pasmo (flax)	Powdery Mildew (soybean)	Rust: Asian Soybean Rust (pulses, soybean)	Rust: *Puccinia helianthi* (sunflower)	Sclerotinia White Mould / Head Rot (oilseeds)
Acapela	318				X					•	•			•		S**
Astound	322	X														CA
Bumper 418EC*	352	X			X				•		•					
Caramba	327				X									•		
Contans	330	X			X	X										(CA,S,SF)**
Folicur 432F / Folicur 250W	372				X						•		•†	•		
Headline EC	338	X	X	X	X	X	CA		•		•	•		•	•	
Lance	344	X				X	•									CA,SF**
Overall 240SC	342	X					CA**									CA
Pivot 418EC*	352	X			X				•		•					
Proline 480SC	350	X	X	X	X						•			•		CA,F,M
Propel*	352	X			X				•		•		•	•		
Propiconazole Fungicide*	352	X			X				•		•					
Quadris	323	X			X		CA		•		•		•	•		CA
Quash	357	X														CA
Quilt	359				X			•			•		•	•		
Rovral Flo/Rx	342	X					CA**									CA
Serenade Max/ASO	368	X			X					•**	•**					(CA,S)**
Stratego 250EC	369				X						•			•		
Tilt 250E*	352	X			X				•		•		•	•		
Vertisan	376	X			X	X				•**	•**			•**	•**	CA, SF**

* Propiconazole = Bumper 418EC, Pivot 418EC, Propel, Propiconazole Fungicide and Tilt 250E

** Suppression only

X Product registered for the crop

† Folicur 432F is not registered for control of powdery mildew in soybeans

- Fungicide registered for disease control on all crops listed unless otherwise noted by the abbreviations listed: canola (CA), flax (F), rapeseed/oriental mustard (M), soybean (S), sunflower (SF)

Table 6. Foliar Fungicides for Disease Control in Pulse Crops

		CROPS					DISEASES									
FUNGICIDES	Page	Bean (B)	Chickpea (CP)	Fababean (FB)	Lentil (L)	Field Pea (P)	Anthracnose (bean, lentil)	Ascochyta Blight (chickpea, lentil, pea)	Bacterial Blight (bean)	Botrytis Gray Mould (bean, chickpea, lentil, pea)	Downy Mildew (bean, pea))	Mycosphaerella Blight (pea, fababean)	Powdery Mildew (pulses)	Rust: *Uromyces* (bean)	Rust: Asian Soybean Rust (pulses)	Sclerotinia White Mould (pulses)
Acapela	318	X	X		X	X						P			B,CP,L,P	(B,CP,L,P)**
Allegro 500F	321	X														B
Bravo 500	328		X		X	X	L	CP, L				P				
Bumper 418EC*	352	X												•		
Contans	330	X														B**
Copper 53W	332	X					B		•		B					
Dithane DG Rainshield NT	346				X		L	L								
Echo 720	328		X		X	X	L	CP, L				P				
Headline Duo	337		X		X	X	L	•		L, P		P	P			L
Headline EC	338	X	X	X	X	X	•	•			P	•	B FB, P	•	B FB, P	
Kocide 2000	332	X							•							
Kumulus DF	343					X							P			
Lance	344	X	X	X	X	X		•		CP, L, P		P				B,CP,FB,L
Manzate Pro-Stick	346				X		L	L								
Parasol WG	332	X							•							
Penncozeb 75DF	346				X		L	L								
Pivot 418EC*	352	X												•		
Priaxor DS	349		X		X	X	L	CP, L				P	P		P	(CP,L,P)**
Proline 480SC	350		X		X			CP, L								
Propel*	352	X	X		X	X							B,CP,L,P	•	B,CP,L,P	
Propiconazole Fungicide*	352	X												•		
Quadris	323	X	X		X	X	•	•				P	B, P		B,CP,L,P	
Quash	357	X	X		X	X		(CP,L)**					P			(B,CP,L,P)**
Quilt	359	X	X		X	X	L					P	B,CP,L,P		B,CP,L,P	
Senator 70WP	367	X														B
Serenade Max/ASO	368	X	X		X	X				•**						(B,CP,L,P)**
Tilt 250E*	352	X	X		X	X							B,CP,L,P	•	B,CP,L,P	
Vertisan	376	X	X		X	X		•		•					(B,CP,L,P)**	

* Propiconazole = Bumper 418EC, Pivot 418EC, Propel, Propiconazole Fungicide and Tilt 250E

** Suppression only

X Product registered for the crop

- Fungicide registered for disease control on all crops listed unless otherwise noted by the abbreviations listed: bean (B), chickpea (CP), fababean (FB), lentil (L), field pea (P)

Foliar Fungicide Product Pages

Acapela

Fungicide Group – 11
(Refer to page 311)

Company:

E.I. duPont Canada Company – PCP# 30470

Formulation:

250g / L picoxystrobin formulated as a suspension concentrate.

Container size 2 x 9.6 L

Crops, Diseases, Rate and Timing:

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Dry legumes (chickpea, field pea, lentil, field, kidney, navy, lima, pinto, mung beans)	Control of Mycosphaerella blight (*Mycosphaerella pinodes*) on field pea; control of Asian soybean rust (*Phakospora pachyrhizi*)	240 to 350	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high.
	Suppression of Sclerotinia rot / white mould (*Sclerotinia sclerotiorum*)	350	For white mould make initial preventative application at beginning bloom and follow with second application 7 to 10 days later at full bloom.
Wheat	Leaf rust (*Puccinia recondita*), Septoria leaf blotch (*Septoria tritici*), powdery mildew (*Erysiphe graminis*), tan spot (*Pyrenophora tritici-repentis*)	175 to 350	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high. Apply at Feekes 9, "flag leaf out". Do not apply after flowering (Feekes 10.5)
Barley	Septoria leaf blotch (*Septoria tritici*), powdery mildew (*Erysiphe graminis*)	175 to 350	
Oats	powdery mildew (*Erysiphe graminis*)	175 to 350	
Rye & triticale	Leaf rust (*Puccinia recondita*), Septoria leaf blotch (*Septoria tritici*), powdery mildew (*Erysiphe graminis*)	175 to 350	
Corn (field corn, sweet corn, seed popcorn)	Northern corn leaf blight (*Setopsphaeria turcica, Exserohilum turcicum*)	215 to 325	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high.
Soybean	Asian soybean rust (*Phakospora pachyrhizi*), Brown spot (*Septoria glycines*), Frogeye leafspot (*Cercospora sojina*)	175 to 350	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high.
	Suppression of Sclerotinia stem rot/white mould (*Sclerotinia sclerotiorum*)	350	Initial preventative application at 100% bloom (1 flower blooming on all plants) and follow with 2^{nd} application 7 to 10 days later at full bloom.

Application Information:

Water Volume: Use sufficient water to obtain thorough coverage of plants.

Ground: minimum 45 L per acre.
Aerial: minimum 20 L per acre.

How it Works:

The active ingredient picoxystrobin is a broad spectrum strobilurin fungicide and is to be used as a preventative application when environmental conditions are favorable for disease development. Picoxystrobin has curative and locally systemic activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None registered.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: Dry legumes – DO NOT exceed 1 application before switching to a fungicide with a different mode of action; maximum season use rate 700 ml per acre. Cereal grains, soybeans – DO NOT exceed 2 applications before switching to a fungicide with a different mode of action; maximum season use rate 1100 ml per acre. Corn – DO NOT exceed 2 applications before switching to a fungicide with a different mode of action; maximum season use rate for field, seed or popcorn is 1100 ml per acre and sweet corn is 1400 ml per acre.

Grazing: No restrictions listed.

Pre-harvest interval: Dry legumes and soybeans – 14 days, Cereal grains – 45 days, (7 days for forage, 14 days for hay), Corn – 7 days

Re-entry: DO NOT re-enter treated areas within 12 hours of application.

Re-cropping: Crops that are on the product label may be replanted immediately after harvest. All other crops -10 months following last application of picoxystrobin.

Storage: Store product in original container only, away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Keep container closer. To prevent contamination, store this product away from food or feed.

Environment: Observe prescribed buffer zones. Minimize off-target drift to reduce the effects on beneficial insects at the field boundary. DO NOT apply to areas prone to run-off and delay spraying if heavy rainfall is forecast.

Hazard Rating:

None listed.

For an explanation of the symbols used here see page 11.

Acrobat 50 WP

Fungicide Group – 40
(Refer to page 311)

Company:

BASF Canada – PCP#27700

Formulation:

50% dimethomorph formulated as a wettable powder. Container size - 8 x 1.82 kg.

Crops, Diseases and Timing:

Control of late blight (*Phytophthora infestans*) and reduction of late blight tuber rot on potato.

Make the first application when the disease threatens or when the first visible signs of disease occur in the field or nearby. Apply every 5 to 7 days under high disease pressure or every 7 to 10 days under low disease pressure. A minimum of 5 days between applications is required. It is recommended to apply this product alternately with a fungicide having a different mode of action. Apply after top kill to control tuber rot under high levels of late blight infection.

Rate:

Apply at 182 g per acre. **DO NOT apply *Acrobat 50 WP* alone.** This fungicide must be tank mixed with one of the following fungicides: *Polyram DF*, *Dithane DG Rainshield NT*, or *Bravo 500*, at the recommended product label rate.

Application Information:

Water Volume: Use sufficient water to obtain adequate spray coverage.
Ground: 20 to 40 L per acre for concentrate sprays to 91 to 648 L per acre for dilute sprays.
Aerial: optimum 20 L per acre.

How it Works:

The active ingredient dimethomorph is a Carboxylic Acid Amide (CAA) fungicide with contact, systemic and antisporulant activity. To be used as a preventative and inhibitive (antisporulant) fungicide application. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Fungicides: Must be tank mixed with one of the following fungicides: *Polyram DF*, *Dithane DG Rainshield NT*, or *Bravo 500*.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT exceed 3 applications of this product per season.

Grazing: No restrictions listed.

Preharvest interval: 4 days.

Re-entry: DO NOT re-enter treated areas within 12 hours of application.

Re-cropping: DO NOT replant in treated area within 120 days of last application.

Storage: Store under cool, dry conditions in secure, well ventilated buildings away from food or feed.

Environment: DO NOT apply to terrain where there is a potential for surface runoff to enter aquatic systems. This product is highly toxic to aquatic organisms. DO NOT apply within 100 m of streams, ponds, rivers and lakes when applying by air and within 50 m when applying by ground. When using *Acrobat 50 WP* consult the labels of the tank mix partner and observe the largest buffer zone of the product used in the tank mix.

Hazard Rating:

⚠ Caution – Potential skin sensitizer.

For an explanation of the symbols used here see page 11.

Allegro 500F

Fungicide Group – 29
(Refer to page 311)

Company:

Syngenta Canada – PCP#27517

Formulation:

40% fluazinam. Container size – 2 x 10 L.

Crops, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Potato	Control of late blight *(Phytophthora infestans)*	162 mL	Begin applications when plants are 15 to 20 cm tall or when conditions favour disease development. Repeat application at 7 to 10 day intervals. DO NOT make more than 3 consecutive applications.
Dry shelled beans	Control of white mould *(Sclerotinia sclerotiorum)*	240 to 405 mL	Begin applications when plants are at early to mid bloom (10 to 50% bloom). Repeat application 7 to 10 days later.

Application Information:

Water Volume: 80 to 240 L per acre. Spray volumes vary with amount of plant growth; apply in sufficient water to obtain adequate coverage of foliage.

How it Works:

The active ingredient fluazinam is a pyridinamine fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Note: Syngenta supports the following mixes that are not on the *Allegro 500F* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides: *Reglone* (potatoes)

Fungicides: *Quadris*

Insecticides: *Matador* (dry beans)

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: Bean – DO NOT exceed 2 applications of this product per season. Potato – DO NOT exceed 10 application of this product per season.

Grazing: No restrictions listed.

Preharvest interval: 14 days (potatoes); 30 days (dry shelled beans).

Re-entry: DO NOT re-enter treated areas within 24 hours of application.

Re-cropping: Can be replanted with potatoes as soon as practical after the last application, 30 days for other root crops and leafy vegetables, and 70 days for all other crops. Fluazinam will carry over, DO NOT use in areas treated with this product during the previous season.

Storage: Store product in a dry place separate from other pesticides, fertilizer, food, and feed.

Environment: DO NOT contaminate aquatic habitats when cleaning and rinsing spray equipment or containers. DO NOT overspray non-target terrestrial or aquatic habitats.

Hazard Rating:

☠ Caution – Poison.

⚠ Warning – skin irritant. Potential skin sensitizer.

For an explanation of the symbols used here see page 11.

Astound

Fungicide Group – 9, 12
(Refer to page 311)

Company:

Syngenta Canada – PCP #29648

Formulation:

37.5% Cyprodinil and 25.0% Fludioxonil formulated as wettable granules. Container size - 2 x 6.28 kg.

Crops, Diseases and Timing:

Control of sclerotinia stem rot caused by *Sclerotinia sclerotiorum* in canola. One application at 20 to 30% flowering.

Rates:

Apply at 314 to 395 g per acre.

Application Information:

Ground and aerial application. Apply higher rate under conditions of high disease pressure.

Apply in sufficient water volume to obtain thorough coverage; a minimum spray volume of 81 L per acre is recommended for ground application or 18 L per acre for aerial application.

How it Works:

The active ingredient cyprodinil is a anilinopyrimidine fungicide and the active ingredient fludioxonil is a phenylpyrrole fungicide. Together they provide contact and systemic activity and inhibit spore germination and penetration. To be used as a preventative and curative fungicide application. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Astound fungicide can be tank mixed with *Matador 120EC* insecticide at a rate of 314 to 395 g per acre *Astound* and 34 mL per acre *Matador 120EC* for control of insects and diseases on canola. Refer to labels for diseases and insects controlled, specific application instructions, and precautions. Pests and crops must be at the correct stage as specified on both labels. DO NOT apply more than 1 application per season of this tank mix.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: No restrictions listed

Grazing: No restrictions listed.

Preharvest interval: DO NOT apply within 35 days of harvest.

Re-entry: DO NOT re-enter treated area within 12 hours of application.

Re-cropping: DO NOT plant any other crop for a period of 30 days after harvest or crop failure unless *Astound* is registered for that use.

Storage: Store in a dry place.

Environment: This product is toxic to aquatic organisms; DO NOT apply directly to aquatic habitats. For ground application, buffer zones must be 1m for protection of aquatic habitats. For aerial application (fixed and rotary wing), buffer zones must be 10 m for aquatic habitats less than 1 m deep and 2 m for aquatic habitats deeper than 1 m. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. DO NOT apply this product through any type of irrigation system.

Hazard Rating:

⚠ Caution – Eye irritant.

Keep out of reach of children.

For an explanation of the symbols used here see page 11.

Azoxystrobin

Fungicide Group – 11
(Refer to page 311)

Quadris / MANA Azoxystrobin

MANA Azoxystrobin 250 **is currently only available as a co-pack with *Bumper 418EC* (see *Blanket*, page 325).**

Company:

Syngenta Canada – (*Quadris* – PCP#26153)
MANA Canada – (*MANA Azoxystrobin* – PCP#30489)

Formulation:

250 g per L azoxystrobin formulated as a flowable suspension concentrate.

Container size – *Quadris* 4 x 3.78 L jugs.
MANA Azoxystrobin 4.8 L jug part of Blanket co-pack

Quadris ONLY – Crops, Diseases, Rates and Timing:

Crop:	Diseases Controlled:	Application Rates (per acre):	Application Timing:
Bean	Anthracnose (*Colletotrichum lindemuthianum*); Powdery mildew (*Erysiphe polygoni*); Asian soybean rust (*Phakopsora pachyrhyizi*)	200 ml	Apply before disease is established and no later than onset of flowering; make 2nd application 10 to 14 days later.
Canola	Blackleg (*Leptosphaeria maculans*)	200 ml	Apply at the 2 to 6 leaf stage.
	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	280 to 400 ml	Apply at early bloom (prior to 30% bloom). This timing will also suppress alternaria black spot. Use the higher rate if there is a history of sclerotinia infection in the area and when conditions favour development.
	Alternaria black spot (*Alternaria brassicae, A. raphani*)	200 ml	Apply at pod stage (90% petal fall).
Chickpea	Ascochyta blight (*Ascochyta rabiei*), Asian soybean rust (*Phakopsora pachyrhyizi*)	200 ml	Apply before disease is established and no later than onset of flowering; make 2nd application 10 to 14 days later.
Coriander*	Blossom blight (*Aureobasidium* spp.)	180 to 450 ml	Apply once prior to disease establishment. Use high rate if high disease pressure.
Corn*	Rust (*Puccinia sorghi*)	180 ml	Apply before disease is established and make 2nd application 7 to 14 days later.
Lentil	Anthracnose (*Collectotrichum truncatum*), Ascochyta blight (*Ascochyta lentis*), Asian soybean rust (*Phakopsora pachyrhyizi*)	200 ml	Apply before disease is established and no later than onset of flowering; make 2nd application 10 to 14 days later.
Pea	Mycosphaerella blight (*Mycosphaerella, Ascochyta* spp.), Powdery mildew (*Erysiphe pisi*), Asian soybean rust (*Phakopsora pachy-rhyizi*)	200 ml	Apply before disease is established and no later than onset of flowering; make 2nd application 10 to 14 days later.

Continued

Quadris ONLY – Crops, Diseases, Rates and Timing *continued*:

Crop:	Diseases Controlled:	Application Rates (per acre):	Application Timing:
Potato	Early blight (*Alternaria solani*)	200 to 320 ml	Apply prior to disease development and repeat on a 7 to 14 day interval. Use the higher rate if extending treatment interval to 14 days. Apply in alternation with fungicides with a different mode of action. If late blight becomes established, discontinue use of *Quadris* and use alternative fungicides.
	Late blight (*Phytophthora infestans*)	320 ml	
	Rhizoctonia stem rot, Stolon canker, Black scurf (*Rhizoctonia solani*)*; Silver scurf (*Helminthosporium solani*)*	4 to 6 ml per 100 m of row	Apply once as an in-furrow spray in 20-56 L per acre water at planting. Mount the spray nozzle so that spray is directed into the furrow as a 15 to 20 cm band just before the seed is covered.
	Black dot (*Colletotrichum coccodes*)	200 to 320 ml	Apply on a 7 to 14 day interval prior to disease development. Use the high rate and short application interval under high disease pressures.
Soybean	Powdery mildew (*Microsphaera diffusa*), Cercospora leaf spot (*Cercospora kiku-chii*), Asian soybean rust (*Phakopsora pachyrhyizi*)	200 ml	Apply at the R1 to R3 stage, or when 5% disease in the field; make 2nd application 14 days later.

* DO NOT apply by air.

MANA Azoxystrobin ONLY – Crops, Diseases, Rates and Timing:

MANA Azoxystrobin is only registered as a tank mix with *Bumper 418EC* fungicide on cereals. Refer to fungicide co-pack product *Blanket* on page 325 for details.

Application Information:

Water Volume:

Ground: Use sufficient water volume to obtain adequate coverage. Use minimum 40 L per acre. *Quadris* only: in-furrow treatment in 20 to 56 L per acre.

Aerial: Use minimum of 18 L per acre. Ensure uniform application.

How it Works:

The active ingredient azoxystrobin is a methoxyacrylate compound (strobilurin) with broad spectrum contact and systemic activity. To be used as a preventative and curative fungicide application. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: For cereals, legumes and field corn, *Quadris* may be tank-mixed with *Matador 120EC* insecticide. For control of potato diseases and insects, *Quadris* can be tank-mixed with *Actara 240* insecticide. Consult each label for pests controlled, appropriate timing, precautions, and specific application instructions.

Fungicides: *MANA Azoxystrobin* is only registered as a tank mix with *Bumper 418EC* fungicide on cereals. Refer to fungicide co-pack product *Blanket* on page 325 for details.

For control of Asian soybean rust in legumes, *Quadris* may be tank-mixed with *Tilt 250E*. For the control of early blight of potato, *Quadris* may be tank-mixed with *Bravo 500*. For control of Rhizoctonia stem, stolon canker and black scurf in potato, *Quadris* can be tank-mixed with *Ridomil Gold 480EC*. For control of ascochyta blight in chickpea, *Quadris* may be tank-mixed with *Bravo 500* (minor use registration). *Quadris* may be tank-mixed with *Tilt 250E* in wheat and barley.

Note: Syngenta supports the following mixes that are not on the *Quadris* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides: *Touchdown Total, Traxion*

Fungidices: *Allegro 500F*

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: Coriander – DO NOT exceed 1 application of this product per season. Bean, canola, chickpea, corn, lentil, pea, soybean – DO NOT exceed 2 applications of this product per season. Potato – DO NOT exceed 3 applications of this product per season.

Grazing: DO NOT feed dried pea vines to livestock.

Preharvest interval: Canola - 30 days. Coriander - 21 days. Corn - 7 days. Legumes - 15 days. Potatoes - 1 day; 90 days for in-furrow application.

Re-entry: DO NOT re-enter treated areas until residues have dried.

Re-cropping: DO NOT plant broadleaf or root crops within 30 days of application. DO NOT plant cereals within 45 days of application.

Storage: Store in a cool, dry, well-ventilated area. DO NOT store below 0°C.

Environment: This product is toxic to fish and aquatic organisms. Observe buffer zones outlined in the label

Hazard Rating:

None.

Other precautions: May irritate eyes

Blanket

Fungicide Group – 3, 11

(Refer to page 311)

***Blanket* is a co-pack of MANA *Azoxystrobin* (PCP #30489), and *Bumper* (PCP #28017; see propiconazole on page 352). Information listed is restricted to crops, diseases, and rates. For other detailed information on the component products, refer to the product labels and the product page listed above.**

Company:

MANA Canada

Formulation:

Blanket has two components:

MANA Azoxystrobin 250 (PCP #30489): 250 g per L azoxystrobin formulated as a suspension. (4.8 L jug)

Bumper 418 EC (PCP #28017): 418 g per L propiconazole formulated as an emulsifiable concentrate (4.8 L jug)

Crops, Diseases, Rates and Timing:

Crop:	Diseases Controlled:	Application Rates (per acre):		Application Timing:
		MANA Azoxystrobin	Bumper	
Barley	Net blotch (*Pyrenophora teres*), scald (*Rhynchosporium secalis*), and barley leaf rust (*Puccinia hordei*).	90 to 120 mL	120 mL	Apply once between stem elongation and half-head emergence (BBCH Growth Stage 29-55). DO NOT make more than one application per season of this tank mixture. An additional application of *Bumper 418 EC* Fungicide can be made, if required. Refer to the *Bumper 418 EC* Fungicide label for details of the rate and timing. A total of two applications of Bumper may be applied per season either in a tank mix with *MANA Azoxystrobin* or alone.
Wheat, barley, rye	Septoria leaf spot (*Septoria* sp.) and tan spot (*Pyrenophora tritici-repentis*)			
Winter wheat, spring wheat, and barley	Stripe rust (*Puccinia striiformis*) and wheat leaf rust (wheat only) (*Puccinia triticina*)	80 to 120 mL	100 to 120 mL	

Restrictions:

See product labels and pages listed above for restrictions and recommendations for resistance management. Follow the most stringent restrictions for either product.

Hazard Rating:

☠ Warning – Poison

⚠ Warning – Eye and Skin Irritant. Potential Skin Sensitizer.

For an explanation of the symbols used here see page 11.

Bravo 500 (2011)

See Chlorothalonil on page 328.

Cabrio Plus

Fungicide Group – 11, M3
(Refer to page 311)

Company:

BASF Canada – PCP#30395

Distributed by Engage Agro Corporation

Formulation:

5% pyraclostrobin and 55% metiram formulated as a water dispersible granule.

Container size – 20 kg.

Crops, Diseases and Timing:

Control of early blight (*Alternaria solani*) and late blight (*Phytophthora infestans*) in potato. Application should begin prior to row closure or when conditions become favourable for the development of disease. For early blight use 0.91 to 1.35 kg per acre and apply on a 7-14 day

Rates:

Apply at 0.91 to 1.35 kg per acre.

Application Information:

Water Volume:

Ground: Minimum of 80 L per acre

Aerial: Minimum of 20 L per acre

How it Works:

The active ingredient metiram is a dithiocarbamate fungicide with contact activity. The active ingredient pyraclostrobin is a member of the strobilurin class of chemistry used as a broad spectrum fungicide. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None registered.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT exceed 3 applications of this product per season.

Grazing: Crop can be grazed or fed to livestock.

Preharvest Interval: 3 days.

Re-entry: DO NOT re-enter treated areas within 12 hours of application.

Re-cropping: A plant back interval of 14 days is required for all crops not listed on the label

Storage: Store in original tightly closed container.

Environmental Hazards: Avoid run-off from treated areas into aquatic areas. Toxic to aquatic organisms, non-target terrestrial plants and small wild animals.

Hazard Rating:

☠ Warning – Poison

⚠ Warning – Eye and Skin Irritant.

For an explanation of the symbols used here see page 11.

Caramba

Fungicide Group – 3
(Refer to page 311)

Company:

BASF Canada – PCP#29767

Formulation:

90 g per L metconazole formulated as an emsulfiable concentrate.

Container size – Case (2 x 8.1L) or 128 L drum.

Crops, Diseases, Rates and Timing:

Crop:	Disease:	Application Rate (per acre)*:	Application Timing:
Wheat (all types) Triticale	Control or suppression of leaf rust, tan spot, septoria leaf spot, suppression of spot blotch	202 to 283 mL	Prior to disease development or at onset of disease.
Barley	Net blotch, scald, leaf rust, suppression of spot blotch		
Oats	Crown rust, septoria leaf blotch		
Rye	Leaf rust		
Wheat Oats Rye Barley	Suppression of fusarium head blight (FHB) Control/suppression of diseases listed above	405 mL	To be used as a preventative fungicide application when environmental conditions are favourable for disease development. Fusarium head blight outbreaks are favoured by warm and wet weather when the cereal crop is at the flowering to soft dough stage and the disease is extremely difficult to control. For optimum suppression of FHB, apply within the time period when at least 75% of the heads for wheat, oats and rye on the main stem are fully emerged to when 50% of the heads on the main stem are in flower. For barley apply between full head emergence and up to 3 days after full emergence of main stem heads.
Soybeans	Control of Asian soybean rust	283 mL	Initial application between early flowering and pod set (R1 and R3 growth) or prior to rust development.
Sugar beets	Control of cercospora leaf spot	405 to 506 mL	Prior to disease development or at onset of disease.

* In cereals a case can treat 40 acres after heading (suppression of FHB) or 60 to 80 acres before heading (leaf disease). In cereals a drum can treat 320 acres after heading (suppression of FHB) or 460 to 640 acres before heading (leaf disease).

Application Information:

Water Volume:

Ground: Minimum of 40 L per acre

Aerial: Minimum of 20 L per acre

Consult nozzle manufacturers for specific nozzle and pressure recommendations.

Leaf diseases: ensure thorough coverage.

Fusarium Head Blight: thorough coverage of target heads is required for optimal suppression of the disease.

How it Works:

The active ingredient metconazole is a broad spectrum triazole demethylation inhibitor (DMI) fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: Wheat, oats, rye, barley – DO NOT exceed 1 application of this product per season. Soybean, sugar beet – DO NOT exceed 2 applications of this product or other DMI (Group 3) fungicides per season.

Grazing: All crops can be grazed or fed to livestock.

Preharvest interval: Wheat, barley, oats, rye and soybeans 30 days and sugar beets 14 days.

Re-entry: Soybean – DO NOT re-enter treated areas within 4 days of application. Wheat, barley, oats, rye – DO NOT re-enter treated areas within 5 days of application. Sugar beet – DO NOT re-enter treated areas within 9 days of application.

Re-cropping: A plant back interval of 35 days is required for all crops not listed on the label.

Storage: Store in original tightly closed container. Protect from freezing.

Environment: Avoid run-off from treated areas into aquatic areas. Toxic to aquatic organisms, non-target terrestrial plants and small wild animals.

Hazard Rating:

⚠ Warning – Eye irritant.

Check label for first-aid information.

For an explanation of the symbols used here see page 11.

Chlorothalonil

Fungicide Group – M5
(Refer to page 311)

Bravo 500/Bravo Zn/Echo 720/Echo 90DF

Company:

Syngenta Canada (*Bravo 500* – PCP#15723, *Bravo Zn* – PCP#28900)

United Agri Products (*Echo 720* – PCP#29355, *Echo 90DF* – PCP#29356)

Formulation:

Bravo 500 - 500 g per L chlorothalonil formulated as a suspension. Container sizes - 2 x 10 L case and 450 L.

Bravo Zn - 500 g per L chlorothalonil formulated as a suspension. Container sizes - 10 L and 450 L.

Echo 720 - 720 g per L chlorothalonil formulated as a suspension. Container size - 2 x 9.46 L case, 450 L and 984.1 L.

Echo 90DF - 90% chlorothalonil formulated as a dry flowable. Container size - 10 kg.

Crops, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rate* (per acre):		Application Timing:
		Bravo 500	***Echo 720***	
Wheat	Tan spot *(Pyrenophora tritici-repentis)*, Septoria glume blotch, Septoria leaf spot (*Septoria* sp.)	600 to 1000 mL	405 to 690 mL	Begin application at flag leaf emergence; repeat 10 to 14 days later when heads are visible. A third application when heads are fully emerged may be necessary.
	Suppression of Fusarium head blight (scab) (*Fusarium* spp.)	800 to 1000 mL	570 to 690 mL	For suppression of fusarium head blight apply at early flowering (before flowering has started in the majority of tillers) and before the beginning of weather favouring disease.
Pea	Mycosphaerella blight *(Mycosphaerella pinodes)*	800 to 1200 mL	570 to 850 mL	Begin application at early flowering and repeat 10 days later at early pod set or mid-flowering if necessary. Make a third application 10 to 14 days after the second application at pod fill or later flowering should conditions remain favourable for disease.

Continued

Crops, Diseases, Rates and Timing *continued*:

Crop:	Diseases:	Application Rate* (per acre):		Application Timing:
		Bravo 500	*Echo 720*	
Lentil	Ascochyta blight *(Ascochyta lentis)*, Anthracnose *(Colletotrichum truncatum)*	800 to 1600 mL	570 to 1130 mL	For one application only, apply at early flowering. For two applications: apply first before flowering when bud formation is evident; apply second at early to mid-flowering 10 to 14 days after the first application but before rows close in.
Chickpea	Ascochyta blight *(Ascochyta rabiei)*	1200 to 1600 mL for first application; 800 to 1200 mL for subsequent applications.	850 to 1130 mL for first application; 570 to 850 mL for subsequent applications.	Make first application at very early flowering and remaining applications at 10 day intervals.

Crop	Diseases:	Application Rate* (per acre):			Application Timing:
		Bravo 500	*Bravo Zn*	*Echo 720*	
Potato	Late blight *(Phytophthora infestans)*	480 to 1000 mL	480 to 1000 mL	320 to 690 mL	Begin application when plants are 6 to 8 inches (15 to 20 cm) high or when disease threatens. Repeat applications at 7 to 10 day intervals or as necessary to maintain disease control.
	Early blight *(Alternaria solani)*	640 to 1000 mL	640 to 1000 mL	445 mL	
	Botrytis vine rot *(Botrytis cinerea)*	640 to 1000 mL	-	480 to 1000 mL	

* Under high disease pressure, use higher rate and shorter spray intervals.

Crop	Diseases:	Application Rate* (per acre): *Echo 90DF*	Application Timing:
Potato	Late blight *(Phytophthora infestans)*	280 to 530 grams	Begin application when plants are 6 to 8 inches (15 to 20 cm) high or when disease threatens. Repeat applications at 7 to 10 day intervals or as necessary to maintain disease control.
	Early blight *(Alternaria solani)*, Botrytis vine rot *(Botrytis cinerea)*	370 to 530 grams	

* Under high disease pressure, use higher rate and shorter spray intervals.

Application Information:

Water Volume: Volume will vary with crop and amount of plant growth. Use sufficient water to obtain adequate coverage of foliage.

Ground: Spray volume will usually range from 90 to 640 L per acre for dilute sprays and 20 to 40 L per acre for concentrate sprays.

Chickpea - 90 L per acre. Ground application only.

Aerial: Use minimum of 12 L per acre.

How it Works:

The active ingredient chlorothalonil is a chloronitrile fungicide with multi-site contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

DO NOT combine with pesticides, surfactants or fertilizers unless prior use has shown the combination is physically compatible and non-injurious under your conditions of use.

Fungicides: For control of early blight in potato, *Bravo 500* may be tank-mixed with 200 mL per acre *Quadris*. DO NOT apply sequential applications of this tank-mix and DO NOT exceed 3 tank-mix applications per season. DO NOT apply to potatoes later than 2 days before harvest. For control of early blight, late blight, and botrytis vine rot in potato and for suppression of storage rots, Pythium leak and pink rot, in potato *Bravo Zn* may be tank mixed with 80 mL per acre *Ridomil Gold 480 EC* or *Ridomil Gold 480 SL*

Herbicides: On lentils, DO NOT apply in combination with *Poast* herbicide and *Merge* surfactant or within 48 hours of the application of *Poast* and *Merge*.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: Lentil – DO NOT exceed 2 applications of this product per season. Wheat, pea, chickpea – DO NOT exceed 3 applications of this product per season. Potato (*Echo 90DF*) – DO NOT exceed 12 applications of this product per season.

Grazing: DO NOT graze treated areas. DO NOT feed straw from treated crop to livestock.

Preharvest interval: Potato - 1 day; Lentil - 48 days; Chickpea – *Bravo 500* - 14 days, *Echo 720* - 48 days; Wheat- 30 days; Pea - 32 days.

Re-cropping: None.

Re-entry: DO NOT re-enter treated area within 48 hours of application. If required, and at least 4 hours have passed since application, individuals may re-enter treated area for short-term tasks not involving hand labour. Long pants, long-sleeved shirt, and chemical resistant gloves must be worn.

Storage: DO NOT store near feed or food stuffs. Store in a cool, dry, ventilated place. Protect from excessive heat.

Environment: DO NOT apply if weather conditions favour drift from area being treated. DO NOT contaminate lakes, streams or ponds. Observe a buffer zone of 100 m for aerial applications and 15 m for ground applications to protect aquatic systems.

Hazard Rating:

☠ Caution – Poison.

⚠ Warning – causes severe eye damage.

For an explanation of the symbols used here see page 11.

Contans WG

Fungicide Group – Not classified, bio-fungicide.

Company:

Prophyta Biologischer Pflanzenschutz., distributed by United Agri Products - PCP#29066.

Formulation:

Wettable Granules - 5.30% *Coniothyrium minitans* strain CON/M/91-08. Contains minimum of 1×10^9 cfu per gram.

Container size - 20kg.

Crops, Diseases Controlled, Rates and Timing

Crop:	Diseases Suppressed:	Application Rate (per acre):	Application Timing:
Pre-plant - Soils where Canola, Sunflower, Dry Edible Bean or Soybean will be planted	White mould or stem rot (*Sclerotinia sclerotiorum*) and rots caused by *S. minor*	0.4 to 0.8 kg	Prior to planting of spring crop; three months before the typical onset of sclerotinia white mould or stem rot. In fall, prior to spring planting of susceptible crop. After application to the soil, the product should be incorporated to within 5 cm of the top-soil.
		0.8 to 1.6 kg	If soil incorporation is to a depth greater than 5 cm, higher rate should be applied.
Post-harvest - On harvest residue of susceptible crops*		0.2 to 0.4 kg	Prior to the next soil treatment, the residues of the susceptible crops in rotation can be also treated to help reduce inoculum loads of sclerotia in the field.

*Regular use of *Contans WG* in successive years within a long-term management strategy will improve disease control.

Application Information:

Use sufficient water volumes to give thoroughly coverage of the soil surface and/or the crop residue (10 gallons per acre of water volume).

Partially fill the spray tank with clean water and begin agitation. Add the specified amount of product to the tank (consult application directions below). Finish filling the tank to the desired volume that provides maximum coverage. Maintain agitation. DO NOT allow spray mixture to stand overnight or for prolonged periods; should be used within 24 hours of being prepared.

Contans should be soil incorporated as thoroughly as possible to a depth of 5 cm. Incorporation should take place as soon as possible after application (within 1 week maximum). Higher rates above 0.8 kg per acre of *Contans* should be used if incorporation is deeper than top 5 cm of soil. After incorporation treated soils should not be disturbed to avoid bringing untreated sclerotia from lower soil depths to the top soil layer.

As part of an overall long term pest management strategy it is recommended to use other management practices along with *Contans* such as in season foliar fungicide applications and proper crop rotations.

DO NOT apply by air.

How it Works:

The active ingredient, *Coniothyrium minitans* is a fungus that infects the sclerotia of *Sclerotinia sclerotiorum* and *S. minor*. Infection of sclerotial bodies prevents production of ascospores and mycelial structures that infect plants. Regular use of *Contans* in successive years within a long-term management strategy will improve disease control.

Tank Mixes:

DO NOT tank-mix with fungicides or fertilizers. Also, DO NOT tank mix with acids, alkalis or any product that attacks organic materials. Contact UAP Canada for more information on what products are compatible with *Contans*.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: No restrictions listed.

Grazing: No restrictions listed.

Preharvest interval: Can be applied up to and including the day of harvest.

Re-entry: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: Maximum storage period of one year at 4°C or below. Up to 6 weeks at temperatures between 4°C and 23°C. Store in a dry area inaccessible to children. Store in original container away from food or feed.

Environment: DO NOT apply this product directly to freshwater habitats, estuarine/marine habitats. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Hazard Rating:

▽ Caution – Potential sensitizer.

For an explanation of the symbols used here see page 11.

Copper

Fungicide Group – M1

(Refer to page 311)

Copper 53W/Copper Spray/Kocide 2000/Parasol WG

Company:

United Agri Products, (*Copper 53W* – PCP#09934, *Copper Spray* – PCP#19146)

E.I. du Pont Canada Company, (*Kocide 2000* – PCP#27348)

Nufarm Agriculture Inc. (*Parasol WG* – PCP#29063)

Formulation:

Copper 53 W - 53% tribasic copper sulphate formulated as a wettable powder. Container size - 10 kg.

Copper Spray - 50% copper oxychloride formulated as a wettable powder. Container size - 10 x 2 kg case.

Kocide 2000 - 35% copper as copper hydroxide formulated as a dry flowable. Container size - 10 to 25 kg.

Parasol WG - 50% elemental copper as copper hydroxide formulated as a wettable granule. Container size - 10 kg.

Crops, Diseases and Timing:

Potatoes - Control of early blight (*Alternaria solani*) and late blight (*Phytophthora infestans*).

Copper 53W: Apply when plants are 5 to 7 inches (12 to 18 cm) tall. Repeat at 7 to day intervals.

Copper Spray: Apply when plants are 4 to 8 inches (10 to 20 cm) tall. Repeat at 7 to 10 day intervals.

Kocide 2000: Apply when plants are 15 cm tall at 7 to 10 day intervals, until harvest.

Parasol WG: Apply when plants are 6 inches (15 cm) tall. Apply combined with 0.7 to 0.9 kg of a mancozeb (80%) product per acre, at 7 to 10 day intervals. *Kocide 2000* and *Parasol* may be applied with a desiccant at vine kill or alone after vine kill, prior to harvest, to reduce the risk of late blight tuber infection. See table for rates.

Beans - Control of anthracnose (*Copper 53W*), downy mildew (*Copper 53W*), and bacterial blight (common and halo) (*Copper 53W, Kocide 2000, Parasol WG*).

First application when plants are 6 inches (15 cm) tall, as a protectant. Repeat every 7 to 14 days depending on local conditions.

See label for more information on user requested minor use label expansion (URMULE) for use as a seed treatment on beans:

For suppression of the following seed borne diseases; common blight (*Xanthomanos axonopodis pv. phaseoli*), halo blight (*Pseudomonas syringae pv. phaseolicola*) and bacterial brown spot (*Pseudomonas syringae pv. syringae*), in dry edible beans and succulent beans.

For every 100 kg seed to be treated, add 113 g *Kocide 2000* to 200 ml of warm water and stir until dissolved. Ensure even coverage and allow treated seed to dry before planting. Treated seed must be labelled as follows: "This seed has been treated with *Kocide 2000*; DO NOT use treated seed for food, feed or oil processing".

Kocide 2000 used as a seed treatment may cause some delay in seed germination. Treat a small quantity of seed using equipment similar to that planned for treating the total seed lot. Conduct germination tests on a small portion of seed before committing the total seed lot to a selected seed treatment.

All seed treated with this product must be conspicuously coloured at the time of treatment. When handling contaminated equipment or treated seed, wear long sleeved coveralls over normal work clothing, chemical resistant gloves and goggles; use an approved respirator with a canister approved for pesticides to minimize exposure to dust when handling, mixing leading product, bagging seed, sewing bags of treated seed or when transferring treated seed to a storage bin.

Refer to the label for additional application instructions and/or use precautions regarding this URMULE.

Rates:

Product	Potato (kg per acre)	Acres treated by 10 kg container	Beans (kg per acre)	Acres treated by 10 kg container
Copper 53W	2.2	4.5	2.2	4.5
Copper Spray	1.6	6.25	–	–
Kocide 2000	0.32 to 0.64 0.967 (vine kill)	31.3 to 15.4 10.34 (vine kill)	0.65 to 0.93	15.4 to 10.7
Parasol WG	0.44 to 1.0 1.36 (vine kill)	23 to 10 7.3 (vine kill)	0.9 to 1.3	11 to 7.7

Application Information:

Water Volume:

Ground:

Kocide 2000 - Enough to ensure thorough coverage. Check label.

Copper 53W, Copper Spray - 88 gallons/acre (400 L per acre).

Parasol(s) - Enough to ensure thorough coverage.

Aerial: DO NOT apply *Copper Spray, Copper 53W, Kocide 2000,* and *Parasol WG* by air.

How it Works:

The active ingredients tribasic copper sulphate, copper oxychloride and copper hydroxide are inorganic fungicides with contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Fungicides: *Kocide 2000* - Can be combined with 0.7 to 0.9 kg per acre of *Manzate Pro-Stick;* and with a desiccant for vine kill.

Herbicides: none registered.

Fertilizers: none registered.

Insecticides: none registered.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: Bean (*Kocide 2000, Parasol WG*) – DO NOT exceed 6 applications of this product per season. Potato (*Kocide 2000, Parasol WG*) – DO NOT exceed 10 applications of this prod- uct per season.

Labelling (*Kocide 2000*): Treated seed must be labeled as follows: "This seed has been treated with *Kocide 2000*; DO NOT use treated seed for food, feed or oil processing."

Grazing: No restrictions listed.

Preharvest interval: 1 day.

Re-entry: DO NOT re-enter treated areas within 48 hours of application.

Re-cropping: No restrictions listed.

Storage: Store in cool, dry, ventilated area, away from feed or food. Keep away from heat, fire and sparks.

Environment: DO NOT apply or allow to drift onto streams or any body of water.

Hazard Rating:

◈ Warning – Poison – (*Copper 53W, Copper Spray*)

▽ Caution – Poison – (*Kocide 2000, Parasol WG*)

◇ Warning – Eye irritant (*Kocide 2000*)

For an explanation of the symbols used here see page 11.

Curzate 60 DF

Fungicide Group – 27
(Refer to page 311)

Company

E.I du Pont Canada Company - PCP#26284

Formulation:

60% cymoxanil formulated as a dry flowable.

Container size - 1.8 kg

Crops, Diseases Timing:

Control of late blight (*Phytophthora infestans*) in potato. Initial applications should start when local conditions indicate that late blight is imminent. Make additional applications at 5 to 7 day intervals.

Rate:

Apply *Curzate 60 DF* at 90 g per acre

Plus

Manzate DF or *Manzate Pro-Stick* at 540 g to 650 g per acre

Application Information:

Water Volume: Utilize sufficient water to obtain thorough coverage - 80 to 400 L per acre.

Aerial Application: DO NOT apply by air.

How it Works:

The active ingredient cymoxanil is a cyanoacetamide-oxime fungicide with locally systemic activity. To be used as a preventative, curative and inhibitive (antisporulant) fungicide application. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

DO NOT use *Curzate 60 DF* alone. Use only in a tank mix with *Manzate DF* or *Manzate Pro-Stick.*

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT exceed 7 applications of this product per season.

Grazing: No restrictions listed.

Preharvest interval: 8 days

Re-entry: DO NOT re-enter treated area within 24 hours of application.

Re-cropping: No restrictions listed.

Storage: Store product in original container in a secure, dry area away from food or feed. Protect against humid air and water. Not for use or storage in or around the home. Keep container tightly closed.

Environment: A buffer zone of 50 m is required between the down-wind edge of the boom and sensitive aquatic habitats such as ponds, lakes, rivers, streams, and wetlands. DO NOT contaminate these habitats when cleaning and rinsing equipment or containers. DO NOT clean sprayer near well or water source or near desirable vegetation.

Hazard Rating:

☠ Danger – Poison.

⚠ Caution – Eye irritant.

For an explanation of the symbols used here see page 11.

Cyazofamid

Fungicide Group – 21
(Refer to page 311)

Ranman 400SC/Torrent 400SC

Company:

ISK Biosciences Corporation; distributed by United Agri Products (*Ranman 400SC*– PCP#27984)

ISK Biosciences Corporation; distributed by Engage Agro Corporation (*Torrent 400SC*– PCP#30392)

Formulation:

400 g per L cyazofamid formulated as a suspension concentrate.

Container size: *Ranman 400SC* - 500ml and 200L.
Torrent 400SC - 6 x 1 L and 4 x 4L

Crops, Diseases and Timing:

Control of late blight (*Phytophthora infestans*) on potato. Begin applications on a 7 day schedule when warning systems forecast disease infection periods or at row closure. Use the low rate under low disease pressure and increase the rate as disease pressure and/or crop development increases, up to the maximum rate. For late blight tuber rot control, ensure that the last 2 to 3 applications prior to desiccation are made at the maximum rate following resistance management practices.

Rates:

0.04 to 0.08 L per acre. *Ranman 400SC* and *Torrent 400SC* should be tank mixed with a non-ionic or organo-silicone surfactant (such as *Sylgard 309* at 0.06 L per acre).

Application Information:

DO NOT apply by air. DO NOT make sequential applications. After one application alternate with at least one application of fungicide with a different mode of action.

Water Volume: Use sufficient volume to obtain coverage of the foliage, 80 to 240 L per acre.

How it Works:

The active ingredient cyazofamid is a cyanoimidazole fungicide with contact activity. To be used as a preventative fungicide application. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None registered.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT exceed 6 applications of this product per season.

Grazing: No restrictions listed.

Preharvest interval: 7 days.

Re-entry: DO NOT re-enter treated areas within 12 hours of application.

Re-cropping: A plant back interval of 30 days is required.

Storage: Store product in original container in a secured dry place separate from other pesticides, fertilizer, food and feed.

Environment: Toxic to aquatic organisms. The specified buffer zones (Field sprayer, 5 m; Field sprayer with use of shrouds, 2 m; Field sprayer with use of cones, 4 m) are required between the point of direct application and the closest downwind edge of sensitive freshwater habitats.

Hazard Rating:

None.

Folicur 432 F/Folicur 250 EW (2013)

See Tebuconazole on page 372.

Gavel 75 DF

Fungicide Group – 22, M3
(Refer to page 311)

Company:

Gowan Canada - PCP#26842

Formulation:

66.7% mancozeb and 8.43% zoxamide formulated as a dry flowable. Container sizes - 3.5 kg, 13.6 kg, 20 kg, 25 kg.

Crops, Diseases and Timing:

Control of early blight (*Alternaria solani*) and late blight (*Phytophthora infestans*) in potato. Optimum disease control is achieved when the fungicide is applied in a regularly scheduled preventative spray program. Begin applications at the first sign of disease or when blight is reported in the area. Apply at 0.90 kg per acre every 7 days under high disease pressure when either disease is present or environmental conditions favour continued disease development.

Apply at 0.70 kg per acre every 7 days under low disease pressure and environmental conditions unfavorable for disease development.

Rate:

Apply at 0.70 to 0.90 kg per acre.

Application Information:

Thorough, uniform coverage is essential for good disease control.

Water Volume:

Ground: 90 L per acre.

Aerial: 18 to 36 L per acre. Use 36 liters of water under high disease pressure to provide better crop coverage.

How it Works:

To be used as a preventative fungicide application. The active ingredient zoxamide is a benzamide fungicide with contact activity. The mancozeb component is a dithio- carbamate fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None registered.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT exceed 6 applications of this product per season.

Grazing: No restrictions listed.

Preharvest interval: 3 days.

Re-entry: DO NOT re-enter treated areas within 48 hours of application.

Re-cropping: A 30 day plant back interval (PBI) is required for leafy vegetables and root and tuber vegetables. For all other crops not included on the label, the PBI should be 140 days.

Storage: DO NOT allow product to freeze. Keep away from fire and sparks. Store in a cool, dry, well ventilated place away from feed or food.

Environment:
Ground application: a buffer zone of 25 m for application by ground sprayer should be established between the last spray swath and the edge of aquatic systems. A buffer zone of 5 m for application by ground sprayer should be established between the last spray swath and the edge of terrestrial habitats such as hedgerows, windbreaks, woodlots, vegetative strips and other vegetation. This pesticide is toxic to fish.
Aerial application: a buffer zone of 20 m is required between the downwind edge of the boom and the closest edge of sensitive aquatic habitats.

Hazard Rating:

▽ Caution – causes moderate eye irritation.

For an explanation of the symbols used here see page 11.

Headline DUO

Fungicide Group – 7, 11
(Refer to page 311)

Company:

BASF Canada – PCP#28862 (*Headline Duo One*) and PCP#28863 (*Headline Duo Two*)

Formulation:

Headline Duo One contains 25.2% boscalid and 12.8% pyraclostrobin formulated as a water dispersible granule. *Headline Duo Two* contains 70% boscalid formulated as a water dispersible granule.

Container size - *Headline Duo One* 6.4 kg + *Headline Duo Two* 1.16 kg. Jugs are split internally and contain both *Headline Duo One* and *Headline Duo Two*. Each split jug treats 20 acres (2 per case).

Crops, Diseases, Rates and Timing:

Crop:	Diseases Controlled:	Rates:
Chickpea	Ascochyta blight *(Ascochyta rabiei)* Ascochyta blight can develop quickly once established so early detection is essential.	*Headline Duo One* must be tank-mixed at a rate of 0.320 kg per acre with *Headline Duo Two* at a rate of 0.058 kg per acre at the beginning of flowering OR at the onset of symptoms. Each split jug of *Headline DUO* treats 20 acres (2 per case).
Field pea	Ascochyta Blight (*Ascochyta* spp.); gray mould (*Botrytis cinerea*); mycosphaerella blight (*Mycosphaerella* spp.); powdery mildew (*Erysiphe* spp.)	
Lentil	Ascochyta blight (*Ascochyta* spp.); white mould (*Sclerotinia sclerotiorum*); gray mould (*Botrytis cinerea*); anthracnose (*Colletotrichum* spp.)	

Application Information:

DO NOT apply sequential applications of this tank mixture combination; alternate to a fungicide with a mode of action other than Group 7 or 11 for at least one application. Water Volume:

Ground: Use a minimum water volume of 40 L per acre on chickpeas. Ensure thorough coverage of foliage.

Aerial: Use a minimum water volume of 20 L per acre. Ensure thorough coverage of foliage

How it Works:

The active ingredient pyraclostrobin is a strobilurin fungicide with broad spectrum contact and systemic activity. The active ingredient boscalid is a carboxamide (SDHI) fungicide with systemic activity. To be used as a preventative application when environmental conditions are favourable for disease development. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None registered.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT exceed 2 applications of this tank mixture per season.

Grazing: Chickpeas can be grazed or fed to livestock.

Preharvest interval: 30 days.

Re-entry: DO NOT re-enter treated areas within 48 hours of application.

Re-cropping: Wait 14 days before planting crops not on the label.

Storage: Store in a cool, dry, locked, well-ventilated area without a floor drain. DO NOT freeze.

Environment: Avoid overspray or drift to sensitive habitats. Maintain specified buffer zones.

Hazard Rating:

☠ Danger Poison – Skin and eye irritant.

For an explanation of the symbols used here see page 11.

Headline EC

Fungicide Group – 11
(Refer to page 311)

Company:

BASF Canada – PCP#27322

Formulation:

250 g per L of pyraclostrobin formulated as an emulsifiable concentrate.

Container size - 6.5 L jug; 104 L tote.

Crops, Diseases, Rates, and Timing:

Crop:	Diseases Controlled:	Application Rate (per acre):	Application Timing:
Wheat	Tan spot (*Pyrenophora tritici-repentis*); Septoria leaf spot (*Septoria tritici; S. nodorum*); Leaf rust (*Puccinia recondita*)	120 to 240 mL	Wheat, barley, rye and oats: For control of leaf diseases apply single application immediately after flag leaf emergence; use higher rate to obtain extended protection; if disease persists or weather conditions are favourable for disease development, apply a second application 10 to 14 days later with a fungicide that contains a different mode of action. To maximize yields in cereals, it is important to protect the flag leaf from disease.
	Powdery mildew (*Erysiphe graminis* f. sp. *tritici*); Spot blotch (*Cochliobolus sativus*); Stripe rust (*Puccinia striiformis*)	160 to 240 mL	
Barley	Net blotch (*Pyrenophora teres*)	120 to 240 mL	
	Scald (*Rhynchosporium secalis*); Spot blotch (*Cochliobolus sativus*); Stripe rust (*Puccinia striiformis*)	160 to 240 mL	
Rye	Leaf rust (*Puccinia recondita*)	120 to 240 mL	
	Powdery mildew (*Erysiphe graminis*)	160 to 240 mL	
Oat	Crown rust (*Puccinia coronata*)	120 to 160 mL	
Canola, rapeseed, canola quality *Brassica juncea,* mustard (oilseed and condiment)	Black spot (*Alternaria brassicae and A. raphani*) Blackleg (*Leptosphaeria maculans*)	120 to 160 mL	Apply in tank mix with supported canola herbicides to control blackleg at the 2 to 6-leaf (rosette) stage. Apply to control alternaria black spot at 20 to 50% bloom (suppression) to early pod stage (90% bloom) for control. Can be tank-mixed with *Lance WDG Fungicide* at 20 to 50% flower to control sclerotinia stem rot and suppress black spot.
Corn	Common rust (*Puccinia sorghi*); Gray leaf spot (*Cercospora zeae-maydis*)	160 to 240 mL	Begin all applications prior to disease development. If disease persists or weather conditions are favourable for disease development, apply a second time 10 to 14 days later with a fungicide that contains a different mode of action. Use higher rate and shorter interval when disease pressure is high.

Continued

Crops, Diseases, Rates, and Timing *continued*:

Crop:	Diseases Controlled:	Application Rate (per acre):	Application Timing:
Chickpea	Ascochyta blight (*Ascochyta rabiei*)	160 to 240 mL Must be tank-mixed with 0.14 to 0.17 kg per acre *Lance WDG*	Apply a tank-mix of *Headline EC* with *Lance* at the beginning of flowering or the onset of symptoms. Ascochyta blight can develop quickly once established so early detection is essential. DO NOT apply sequential applications of this tank-mix; alternate to a fungicide with a mode of action other than Group 7 or 11 for at least one application.
Lentil	Anthracnose (*Colletotrichum truncatum*) Ascochyta blight (*Ascochyta lentis*)	160 mL	Lentil, field pea, dry bean, faba bean and soybean: Apply at the beginning of flowering or at the onset of symptoms for more aggressive diseases (anthracnose in lentil). If disease persists or weather conditions are favourable for disease development, apply a second application 10 to 14 days later with a fungicide that contains a different mode of action. Anthracnose in lentils, downy mildew in peas, and Asian soybean rust can develop quickly once can develop quickly once established so early detection is critical.
Field pea	Mycosphaerella blight (*Mycosphaerella, Ascochyta* spp.) Powdery mildew (*Erysiphe* spp.)	160 mL	
	Asian soybean rust (*Phakopsora pachyrhizi*) Downy mildew (*Peronospora viciae* f.sp. *pisi*)	160 to 240 mL	
Dry bean (*Phaseolus* spp.)	Anthracnose (*Colletotrichum lindemuthianum*) Powdery mildew (*Erysiphe* spp.) Rust (*Uromyces* spp.)	160 mL	
	Asian soybean rust (*Phakopsora pachyrhizi*)	160 to 240 mL	
Faba bean	Mycospaerella blight (*Mycosphaerella* spp.) (*Ascochyta fabae*); Powdery mildew (*Erysiphe*)	160 mL	
	Asian soybean rust (*Phakopsora pachyrhizi*)	160 to 240 mL	
Soybean	Frogeye leaf spot (*Cercospora sojina*); Asian soybean rust (*Phakopsora pachyrhizi*)	160 to 240 mL	
Sunflowers	Rust (*Puccinia helianthi*)	160 mL	Apply for optimum disease suppression prior to disease development. If disease persists or weather conditions are favourable for disease development, apply a second application 10 to 14 days later with a fungicide that contains a different mode of action.
Flax (including low-linolenic acid varieties)	Pasmo (*Septoria linicola*)	120 to 160 mL	Apply at the mid flower stage (7 to 10 days after the initiation of flowering). If disease persists or weather conditions are favourable for disease development, apply a second application 10 to 14 days later with a fungicide that contains a different mode of action.
Alfalfa (for seed production)	Common leaf spot (*Pseudopeziza medicaginis*)	160 mL	Apply at the beginning of flowering (10 to 30% bloom) or at the onset of disease.
Bluegrasses; fescues; ryegrasses (for seed production)	Leaf and stem rust (*Puccinia recondita; P. graminis*); Powdery mildew – suppression (*Erysiphe graminis*)	160 to 270 mL	Apply prior to disease development; apply second application 14 to 21 days later if disease conditions persist with a fungicide that contains a different mode of action. Use higher rate and shorter interval when high disease pressure.

Continued

Crops, Diseases, Rates, and Timing *continued:*

Crop:	Diseases Controlled:	Application Rate (per acre):	Application Timing:
Potato	Early blight *(Alternaria solani)* (Spray interval: 7 to 14 days)	180 to 270 mL	Apply prior to row closure or when conditions become favourable for disease development (whichever comes first). Use higher rates, shorter spray intervals and/or tank-mix with either *Polyram DF* or *Bravo* 500 under heavy disease pressure. DO NOT make more than 1 application in potatoes for late blight and early blight control before before alternating to a fungicide with a different mode of action.
	Late blight *(Phytophthora infestans)* (Spray interval: 5 to 7 days)	180 to 270 mL	
	Late blight *(Phytophthora infestans)* (Spray interval: 7 to 10 days)	180 to 270 mL In tank-mix with *Polyram DF* or *Bravo 500*	

Application Information:

Water Volume:

Ground: Use a minimum water volume of 40 L per acre on oilseeds, cereals, pulses, alfalfa and grasses; use 80 L per acre on potatoes. Ensure thorough coverage of foliage.

Aerial: Use a minimum water volume of 20 L per acre. Ensure thorough coverage of foliage. DO NOT apply more than 160 mL per acre by aerial application.

Pivot or Sprinkler irrigation: DO NOT exceed 0.64 cm (1/4 inch) (63,500 L) per hectare. DO NOT apply registered tank mixes in potato, chickpea, and canola by pivot or sprinkler irrigation. Apply only through overhead sprinkler systems including centre pivot and lateral move containing low pressure drop nozzles.

How it Works:

The active ingredient pyraclostrobin is a strobilurin fungicide with broad spectrum contact and systemic activity. To be used as a preventative application when environmental conditions are favourable for disease development. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Herbicides: *Headline EC* at a rate of 120 to 160 mL per acre can be tank mixed with *Odyssey* on canola quality *Brassica juncea* with Clearfield trait, *Ares, Odyssey, Odyssey DLX,* and *Tensile* on Clearfield canola, *Liberty Herbicide* (150SN or 200SN) in glufosinate ammonium tolerant canola (eg: LibertyLink canola), registered glyphosate herbicides in glyphosate tolerant canola (eg: Roundup Ready), *Poast Ultra* in canola, and *Equinox EC* in canola and canola quality *Brassica juncea.*

Insecticides: None registered.

Fertilizers: None registered.

Fungicides: On chickpea, *Headline EC* at a rate of 160 to 240 mL per acre must be applied in tank-mix with 140 to 170 grams per acre *Lance* for control of ascochyta blight. On potatoes, *Headline EC* at rates of 180 to 270 mL per acre may be applied in tank-mix with *Polyram DF* or *Bravo 500* at label rates, additional use recommendations, restrictions, and precautions for the control of late blight. On canola, *Headline EC* can be tank mixed with *Lance Fungicide* at 142 grams per acre at 20 to 50% flowering to control sclerotinia stem rot and suppress black spot.

Restrictions::

Resistance management: Refer to page 309.

Maximum Number of Applications: DO NOT exceed 1 sequential application of this product per season. Any subsequent applications of this product must be in combination with a fungicide that contains a different mode of action. Alfalfa – DO NOT exceed 1 application of this product per season. Canola, rapeseed, canola quality *Brassica juncea,* mustard, flax, dry bean, faba bean, lentil, field pea, chickpea, bluegrass, fescue grass, ryegrass, corn, soybean, sunflower – DO NOT exceed 2 applications of this product per season. Potato – DO NOT exceed 3 applications of this product per season.

Grazing: DO NOT graze treated corn crops within 6 days of last application. DO NOT feed alfalfa hay or forage to livestock. All other crops listed can be grazed or fed to livestock.

Preharvest interval: Barley, rye, wheat, oat – apply no later than the end of flowering, Corn – 7 days, Pulses – 30 days, Forage grasses – 14 days, Alfalfa -not applicable, Oilseeds – 21 days, Potatoes – 3 days.

Re-entry: DO NOT re-enter treated areas within 12 hours of application.

Re-cropping: Crops listed on label may be planted immediately following last application. Wait 14 days before planting all other crops.

Storage: Store in a cool, dry, locked, well-ventilated area without a floor drain. DO NOT freeze.

Environment: Avoid overspray or drift to sensitive habitats. Maintain specified buffer zones. DO NOT spray non-target terrestrial or aquatic habitats.

Hazard Rating:

☠ Danger Poison – Skin and eye irritant.

For an explanation of the symbols used here see page 11.

Inspire

Fungicide Group – 3
(Refer to page 311)

Company:

Syngenta Canada – PCP #30004

Formulation:

250 g per L difenoconazole formulated as an emsulfiable concentrate.

Container size – 4x1.12 L.

Crops, Diseases, Rates, and Timing:

Crop:	Diseases Controlled:	Application Rate (per acre):	Application Timing:
Potato	Early blight (*Alternaria solani*)	118 to 207 mL	Begin application at first sign of disease of when conditions are conducive for disease development. Repeat application 7 to 14 days after the first application. Maximum 2 consecutive applications before rotating to fungicide with another mode of action. Under severe disease pressure, use higher rate at 7 day interval.
Sugar beets	Cercospora leaf spot (*Cercospora beticola*), Powdery mildew (*Erysiphe polygoni*)	118 to 207 mL	Prior to disease development of at onset of disease. Apply on a 7 to 28 day schedule alternating with a non-triazole (Group 3) fungicide. Under severe disease pressure, use higher rate at 7 day interval.

* DO NOT apply more than 826 mL per acre per season. DO NOT apply *Inspire* or other products containing difenoconazole more than one year out of two.

Application Information:

Water Volume:

Ground: Minimum of 60 L per acre.

Consult nozzle manufacturers for specific nozzle and pressure recommendations. DO NOT apply this product through any type of irrigation system.

How it Works:

The active ingredient difenoconazole is a triazole fungicide with broad spectrum, systemic activity. To be used as a preventative and curative fungicide application. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Fungicides: *Inspire* may be mixed with *Revus* (also available as co-pack *Revus Top*). DO NOT make more than 4 applications of this tank mix per season.

Inspire may be mixed with *Bravo 500*.

Restrictions:

Resistance management: Refer to page 309.

Preharvest interval: DO NOT apply within 14 days of harvest.

Re-entry: DO NOT re-enter treated area within 12 hours after application.

Re-cropping: DO NOT plant any other crop for a period of 8 months after application unless Inspire is registered for that crop.

Storage: Store in cool, dry place. DO NOT store near food, beverages, or tobacco products.

Environment: This product is toxic to aquatic organisms and certain beneficial insects. Buffer zones of 11 m must be left from the downwind edge of the boom to the sensitive habitats. Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy. Avoid run-off from treated areas into aquatic habitats by including a vegetative strip between the edge of the treated area and the water body.

Hazard Rating:

⚠ Warning – causes severe eye damage.

Check label for first-aid information.

For an explanation of the symbols used here see page 11.

Iprodione

Fungicide Group – 2
(Refer to page 311)

Rovral Flo / Rovral RX / Overall 240SC

Company:

FMC Corporation (*Rovral Flo* - PCP#29315)
FMC Corporation (*Rovral RX* - PCP#24378)
MANA Canada (*Overall 240SC* – PCP#30275)

Formulation:

240 g per L iprodione formulated as a liquid flowable. Container size - 8.4 L.

Crops, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rates (per acre):	Application Timing
Canola	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	**Single application*:** 0.85 to 1.25 L **Split application* (*Rovral Flo/RX* only):** 0.42 to 0.63 L at 20% bloom; followed by 0.42 L at 50% bloom. **Single application for low disease pressure and light crop stands (*Rovral Flo/RX* only):** 0.63 L	Apply at 20 to 50% bloom stage (approximately 4 to 8 days after crop begins to flower). Best protection achieved when applied at the 20 to 30% bloom stage (prior to petal fall). Can be applied until 50% bloom stage (when crop is at its maximum yellow color and prior to significant petal fall).
	Alternaria black spot (*Alternaria brassicae* and *A. raphani*) (suppression only)	**Single application:** 0.85 L **Split applications:** 0.42 L each application.	**Single application:** Apply at early green pod stage. **Split application:** Apply first application at 20 to 50% bloom, followed by second application at early green pod stage.
Alfalfa (grown for seed)	Sclerotinia (*Sclerotinia sclerotiorum*)	0.85 to 1.25 L *	Make a single application at the 20 to 50% bloom stage.

* Lower rate recommended for most crops; use higher rate for fields with history of severe disease pressure and dense crop stands.

Application Information:

Water Volume: Good coverage of the plants is essential. ***Ground:*** 40 L per acre

Air (canola only): Minimum of 18 L per acre

How it Works:

The active ingredient iprodione is a dicarboximide fungicide with contact activity. To be used as a preventative and eradicant fungicide application. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None registered.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT exceed 2 applications of this product per season.

Grazing: DO NOT use treated alfalfa for animal feed.

Preharvest interval: 38 days.

Re-entry: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: Protect from frost.

Environment: DO NOT apply directly to water. DO NOT contaminate sensitive areas through spray drift, direct application, disposal of waste or cleaning equipment. Observe specified buffer zones.

Hazard Rating:

☠ Caution – Poison.

◇ Warning – Skin and Eye Irritant.

For an explanation of the symbols used here see page 11.

Kumulus DF

Fungicide Group – M2
(Refer to page 311)

Company:

BASF Canada – PCP#18836

Formulation:

80% sulphur formulated as a water dispersible granular. Container size - 25 kg bag.

Crops, Diseases and Timing:

Control of powdery mildew (*Erysiphe* spp.) on field pea. Spray at first appearance of disease and repeat at 7 to 10 day intervals as necessary.

Rate:

0.6 kg per acre (one bag treats 41 acres).

Application Information:

Water Volume: Minimum of 40 L per acre. Higher water volumes may be required later in the growing season. Use sufficient water volume to thoroughly cover all foliage.

How it Works:

The active ingredient sulphur is an inorganic fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Fungicides: *Kumulus DF* is miscible and compatible with *Polyram DF*.

DO NOT mix with dinitro compounds, tetradifon or oils.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: No restrictions listed.

Grazing: No restrictions listed.

Preharvest interval: 1 day.

Re-entry: DO NOT re-enter treated areas within 24 hours of application.

Re-cropping: No restrictions listed.

Storage: Keep away from heat, fire or sparks. Store in cool, dry, locked, well-ventilated area without floor drain.

Environment: Avoid drift onto neighbouring crops; may cause leaf burn.

Hazard Rating:

None.

Lance WDG Fungicide

Fungicide Group – 7
(Refer to page 311)

Company:

BASF Canada – PCP#27495

Formulation:

70% boscalid formulated as a water dispersible granular.
Container size - 2 x 2.83 kg per case.

Crops, Diseases, Rates and Timing:

(Ground, Aerial, and Pivot or Sprinkler Irrigation Applications)

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Alfalfa (seed production only)	Control of blossom blight (*Sclerotinia sclerotiorum/ Botrytis cinerea*); common leaf spot (*Pseudopeziza medicaginis*); Spring black stem (*Phoma medicaginis*); leaf spot (*Leptosphaerulina briosiani*)	170 g	Apply at 20 to 50% flowering. Apply every 7 to 14 days if disease persists, or weather conditions are favourable for disease development.
Canola and Mustard (oilseed and condiment)	Control of sclerotinia stem rot (*Sclerotinia sclerotiorum*)	142 g	Apply at 20 to 50% flowering. Apply a second time 7 to 14 days later up to full bloom if disease persists, or weather conditions are favourable for disease development.
	Control of black spot (*Alternaria brassicae* and *A. raphani*)	142 g	Apply at late flowering to early green pod.
Dry beans (Including field bean and faba bean)	Control of white mould (*Sclerotinia sclerotiorum*)	227 to 312 g	Apply at 20 to 50% flowering. Apply a second time 7 to 14 days later if disease persists, or weather conditions are favourable for disease development. Use the higher rate to obtain extended protection and maximum yield benefit.
Potato	Control of early blight (*Alternaria solani*)	70 to 126 g	Apply prior to disease development and at 14 day intervals if conditions continue to favour disease development.
	Control of late blight (*Phytophthora infestans*)	70 to 126g	Lance must be tank-mixed with *Polyram DF* or *Bravo 500* for control of late blight. Begin applications prior to late blight development. Ground and aerial only.

(Ground and Aerial Applications)

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Chickpea** Lentil	Control of ascochyta blight (*Ascochyta* spp.), white mould (*Sclerotinia sclerotiorum*), gray mould (*Botrytis cinerea*)	170 g	Apply at the beginning of flowering. Apply a second time 7 to 14 days later if disease persists, or weather conditions are favourable for disease development.
Sunflower	Suppression of sclerotinia head rot (*Sclerotinia sclerotiorum*), leaf spot (*Alternaria helianthi*)	142 to 259 g	Apply at early flower for optimal disease suppression. Use the higher rate when disease pressure is high or there is a history of high disease in the field.

** For the control of ascochyta blight in chickpea, *Lance* should be mixed with 160 to 240 mL per acre *Headline EC*.

Continued

Crops, Diseases Controlled, Rates and Timing *continued*:

(Ground Application Only)

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Pea***	Control of ascochyta blight (*Ascochyta* spp.); mycosphaerella blight (*Mycosphaerella* spp.); gray mould (*Botrytis cinerea*)	170 g	Apply at the beginning of flowering. Apply a second time 7 to 14 days later if disease persists, or weather conditions are favourable for disease development.

*** DO NOT apply by air

Application Information:

Water Volume:

Aerial (registered for all crops but peas): Use a minimum water volume of 16 L per acre and ensure thorough coverage of foliage.

Ground: Use a minimum water volume of 40 L per acre and ensure thorough coverage of foliage.

Pivot and Sprinkler Irrigation: DO NOT exceed 0.64 cm (1/4 inch) or 25,700 L per acre. Apply only through sprinkler systems including centre pivot, lateral move, end two, side (wheel) roll, traveler, big gun, solid set, or hand move irrigation systems.

How it Works:

The active ingredient boscalid is a carboxamide (SDHI) fungicide with systemic activity. To be used as a preventative application when environmental conditions are favourable for disease development. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: For control of corn borer in succulent beans, *Lance* can be tank-mixed with *Matador 120 EC* at 37 mL per acre.

Fungicides: For the control of late blight on potato, *Lance* at rates of 70 to 126 g per acre must be applied with *Polyram DF* or *Bravo 500* at their respective label rates for late blight control. For the control of ascochyta blight on chickpea, *Lance* at rate of 140 to 170 g per acre should be applied with 160 to 240 mL per acre *Headline EC*.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: Sunflower – DO NOT exceed 1 application of this product per season. Canola, mustard, dry bean, chickpea, lentil, pea – DO NOT exceed 2 applications of this product per season. Alfalfa – DO NOT exceed 3 applications of this product per season. Potato – DO NOT exceed 4 applications of this product per season.

Grazing: All crops except alfalfa (grown for seed) can be grazed or fed to livestock.

Preharvest interval: Beans, canola, chickpea, lentil, pea - 21 days; potato - 30 days; alfalfa - not applicable.

Re-entry: DO NOT re-enter treated area for 12 hours after application or until dry.

Re-cropping: A plant back restriction of 14 days is required for all crops not on the label.

Storage: Store in a cool, dry, locked, well-ventilated area without a floor drain.

Environment: DO NOT apply to any body of water. Avoid drifting of spray onto any body of water or other non-target areas. Specified buffer zones should be observed

Hazard Rating:

☠ Caution Poison – Potential Skin Sensitizer.

⚠ Warning – Eye Irritant.

For an explanation of the symbols used here see page 11.

Mancozeb

Fungicide Group – M3
(Refer to page 311)

Dithane DG Rainshield NT/Manzate Pro-Stick/Penncozeb 75 DF

Company:

Dow AgroSciences (*Dithane DG Rainshield NT* – PCP#20553)

United Phosphorus Inc; (*Manzate Pro-Stick* – PCP#28217)

United Phosphorus Inc. distributed by United Agri Products (*Penncozeb 75 DF* – PCP#25397)

Formulations:

Dithane DG Rainshield NT - 75% mancozeb formulated as a water dispersible granule. Container size - 3.5 to 544 kg.

Manzate Pro-Stick - 75% mancozeb formulated as a dry flowable. Container sizes - 10 to 20 kg.

Penncozeb 75 DF - 75% mancozeb formulated as a wettable granule. Container sizes - 2.5 to 250 kg.

Crops, Diseases, Rates and Timing:

Crop:	Diseases Controlled:	Application Rate (per acre):	Application Timing:
Potato	Early blight (*Alternaria solani*), Late blight (*Phytophthora infestans*)	0.45 to 0.90 kg	Apply at 0.45 kg per acre rate when plants are 10 to 15 cm high; increase to 0.7 kg per acre as plants increase in size, and 0.9 kg per acre at row closure. Apply every 7 to 10 days. Spray interval may be reduced to 5 to 6 days during periods of wet weather favouring late blight and/or vigorous crop growth.
Wheat	Tanspot (*Pyrenophora tritici-repentis*), Leaf rust (*Puccinia recondita*), Septoria leaf blotch (*Septoria* sp)	0.45 to 0.9 kg	Apply 0.45 kg per acre early (when crop is in the 3-leaf to tillering stage); apply 0.9 kg per acre later (when head is fully emerged, but prior to flowering).
Lentil	Anthracnose (*Colletotrichum truncatum*) Ascochyta blight (*Ascochyta lentis*)	0.9 kg	Apply first application before flower when bud formation is evident; apply second application 10 to 14 days later at early to mid-bloom but prior to row closure. A third application may be applied 10 to 14 days later.
Alfalfa (for seed)	Leaf and stem spot diseases (*Pseudopeziza medicaginis*)	0.6 kg	Apply first application prior to 50% bloom; apply second application 7 to 10 days later; apply third application 10 days after second.

Application Information:

Water Volume:

Thorough uniform coverage is essential for good disease control.

Ground: 40 L per acre (wheat); 40-80 L per acre (lentil)

Air: 16 L per acre (wheat, lentil, potato)

How it Works:

The active ingredient mancozeb is a dithiocarbamate fungicide with multi-site contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Fungicides (potato only): For early and late blight control, *Manzate Pro-stick* can be tank-mixed with *Kocide 2000*; and for control of late blight, with *Curzate 60 DF*.

Insecticides: None registered.

Herbicides: None registered.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: Wheat – DO NOT exceed 2 applications of this product per season. Lentil, alfalfa – DO NOT exceed 3 applications of this product per season.

Grazing: DO NOT graze or feed treated crop or straw to livestock. DO NOT graze or cut treated alfalfa for hay.

Preharvest interval: Potato - 1 day; Lentil - 35 days; Wheat - 40 days

Re-entry: DO NOT re-enter treated areas within 24 hours of application.

Re-cropping: No restrictions listed.

Storage: Store in cool, dry, well-ventilated place. Keep away from fire and sparks.

Environment: Toxic to aquatic organisms. DO NOT contaminate any body of water by direct application, drift or by cleaning equipment.

Hazard Rating:

Warning – Poison.

Danger – Eye irritant.

For an explanation of the symbols used here see page 11.

Phostrol

Fungicide Group – 33
(Refer to page 311)

Company:

Engage Agro Corporation – PCP#30449

Formulation:

53.6% mono- and dibasic sodium, potassium, and ammonium phosphites formulated as a liquid flowable.

Container size - 2 x 10 L and 1000 L

Crops, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rate (L per acre)	Application Timing:
Potato	Suppression of pink rot (*Phytophthora erythroseptica*)	2.3 to 4.7	In furrow: Apply in a band at planting directly over the seed pieces prior to row closure.
	Late blight (*Phytophthora infestans*)	1.2 to 4.7	Foliar applications: For preventative control of late blight and preventative suppression of pink rot begin applications when conditions favouring disease development exist and continue on a 7-14 day interval.
	Suppression of pink rot (*Phytophthora erythroseptica*)	2.3 to 4.7	
	Late blight (*Phytophthora infestans*) *Pink rot (Phytophthora erythroseptica)*	0.17 to 0.81	Post harvest control: Apply directly to the tubers and ensure complete and even coverage.

Application Information:

Water Volume:

Ground: Minimum of 32 L per acre for in-furrow treatment and minimum of 81 L per acre for foliar applications

Aerial: Minimum of 20 L per acre

How it Works:

The active ingredient mono- and dibasic sodium, potassium, and ammonium phosphite is a phosphonates fungicide with systemic activity to suppress pathogen inoculum. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Pink rot: *Ridomil Gold 480SL* (in furrow), *Ridomil Gold MZ* and *Ridomil Gold Bravo Twin Pack* (foliar)

Late Blight: May be tank mixed with one of the following fungicides: *Bravo 500, Bravo ZN, Echo 720, Echo 90DF, Ridomil Gold Bravo Twin Pack, Dithane DG Rainshield NT, Manzate Pro-Stick, Gavel 75DF, Penncozeb 75DF*

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: Do NOT exceed 7 applications of this product per season

Grazing: Do NOT graze treated fields or feed treated forage to livestock.

Preharvest interval: May be applied up to the day of harvest and post harvest.

Re-entry: Re-entry interval after application is 12 hours.

Re-cropping: A plant back interval of 14 days is required for all crops not listed on the label.

Storage: Store in original tightly closed container.

Environment: Avoid run-off from treated areas into aquatic areas.

Toxicity: Toxic to aquatic organisms, non-target terrestrial plants and small wild animals.

Hazard Rating:

▽ Caution – Skin irritant.

For an explanation of the symbols used here see page 11.

Polyram DF

Fungicide Group – M2
(Refer to page 311)

Company:

BASF Canada – PCP#20087

Formulation:

80% metiram formulated as dry flowable.

Container size - 20 kg.

Crops, Diseases and Timing:

Control of early blight (*Alternaria solani*) and late blight (*Phytophthora infestans*) on potato. Apply at 7 to 10 day intervals using 0.45 to 0.71 kg per acre until plants cover the row. Then increase the rate to 0.91 kg per acre until tops are killed, or use 0.45 to 0.71 kg per acre at 5 to 7 day intervals starting when plants are 15 cm high and continuing until top killing. When conditions (rain or dew) favour infections, use the shorter intervals in each case.

Rates:

0.45 to 0.91 kg per acre

Tank Mixes:

Herbicides: None registered.

Fertilizers: *Polyram DF* can be mixed with liquid fertilizers after a physical compatibility test has been conducted.

Insecticides: Mixtures with *Diazinon* or *Malathion* should be prepared immediately prior to use and not allowed to stand in the tank.

Fungicides: None registered.

Application Information:

Water Volume:

Ground: 40 to 80 L per acre.

Aerial: 22 L per acre.

How it Works:

The active ingredient metiram is a dithiocarbamate fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: No restrictions listed

Grazing: DO NOT use treated crop parts for feed or food.

Preharvest interval: May be applied up to the day before harvest.

Re-entry: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: Store in a cool, dry place away from flame or sparks. If product becomes wet or overheated, effectiveness is reduced and flammable vapors may be produced. DO NOT freeze.

Environment: DO NOT apply when environmental conditions favor drift from treated area. DO NOT contaminate domestic or irrigation water, lakes, streams or ponds by the cleaning of equipment or otherwise.

Hazard Rating:

▽ Caution – Potential skin sensitizer.

◇ Warning – Product contains the allergen soy.

For an explanation of the symbols used here see page 11.

Priaxor DS

Fungicide Group – 7, 11
(Refer to page 311)

Company:

BASF Canada – PCP#30646

Formulation:

250 g per L fluxapyroxad and 250 g per L pyraclostrobin formulated as a suspension concentrate.

Container size – 9.6 L jug or 120 L tote

Crops, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rate (per acre)	Application Timing:
Chickpea	Ascochyta blight (*Ascochyta rabiei*)	160 mL	Apply at beginning of flowering or at the onset of disease symptoms. Use the 160 mL per acre rate to obtain extended protection with maximum yield benefits. If disease persists or weather conditions are favourable for disease development, make a second application 10 to 14 days later with a fungicide that contains a different mode of action.
	White mould suppression (*Sclerotinia sclerotiorum*)	120 to 160 mL	
Field Pea	Mycosphaerella blight (*Mycosphaerella pinodes*)	120 mL	
	Powdery mildew (*Erysiphe pisi*), Asian soybean rust (*Phakopsora pachyrhizi*)	160 mL	
	White mould suppression	120 to 160 mL	
Lentil	Ascochyta blight (*Ascochyta lentis*) and suppression of white mould (*Sclerotinia sclerotiorum*)	120 to 160 mL	
	Anthracnose (*Colletotrichum truncatum*)	120 mL	

*Use of a non-ionic surfanctant (0.125% v/v) is recommended but not required.

Application Information:

Water Volume:

Ground: Minimum of 40 L per acre

Aerial: Minimum of 20 L per acre

Consult nozzle manufacturers for specific nozzle and pressure recommendations.

How it Works:

The active ingredient fluxapyroxad is a carboximide (SDHI) fungicide with systemic activity. The active ingredient pyraclostrobin is a member of the strobilurin class of chemistry used as a broad spectrum fungicide. To be used as a preventative application when environmental conditions are favourable for disease development. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None registered.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT make sequential applications of this product before alternating to at least one application of a fungicide with a different mode of action. DO NOT exceed 2 applications of this product per season.

Grazing: All crops can be grazed or fed to livestock.

Preharvest interval: DO NOT apply within 30 days of harvest.

Re-entry: DO NOT re-enter treated areas within 12 hours after application.

Re-cropping: Tuberous and corm vegetables, sugar beets, legume vegetables, pome fruits, stone fruits, cereals and oilseeds may be planted immediately following the last application. A plant-back interval of one year is required for all other crops.

Storage: Store in original tightly closed container. Protect from freezing. Store away from food or feed.

Environment: Toxic to aquatic organisms, small mammals and non-target terrestrial plants. Maintain specified buffer zones. The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable and/or depth of the water table is shallow.

Hazard Rating:

☠ Danger – Eye irritant.

Check label for first-aid information

For an explanation of the symbols used here see page 11.

Proline 480 SC

Fungicide Group – 3
(Refer to page 311)

Company:

Bayer CropScience - PCP#28359

Formulations:

480 g per L prothioconazole formulated as a suspension concentrate. Container size - 5.1 litre.

Crops, Diseases, Rates, and Timing:

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Barley; Wheat	Suppression of fusarium head blight (*Fusarium* spp.)	126 to 168[1] mL	**Timing of application is critical:** **Barley:** Apply within the time period when 70 to 100% of barley heads on the main stem are fully emerged to 3 days after full head emergence. **Wheat:** Apply within the time period from when at least 75% of wheat heads on the main stem are fully emerged to when 50% of heads on the main stem are in flower. Use higher rate when disease pressure is expected to be high or to provide the highest level of mycotoxin reduction. **Spray coverage is essential for optimum efficacy:** Spray equipment must be set to provide good coverage to heads. Use forward and backward mounted nozzles, or nozzles that have a two-directional spray.
Barley	Control of net blotch (*Pyrenophora teres*); scald (*Rhynchosporium secalis*); spot blotch (*Cochliobolus sativus*)	84 to 126 mL	Apply as a preventative foliar spray when the earliest disease symptoms appear on leaves and stems. Minimum spray interval of 7 days.
Wheat	Control of glume blotch (*Stagonospora nodorum*)	168[1] mL	(same timing as for fusarium head blight)
	Control of speckled leaf blotch (*Septoria tritici*); tan spot (*Pyrenophora tritici-repentis*); leaf rust (*Puccinia recondita*)	126[1] mL	Apply as a preventative foliar spray when the earliest disease symptoms appear on leaves and stems. Minimum spray interval of 7 days.
Oat	Control of crown rust (*Puccinia coronota*)	126[1] mL	Apply as a preventative foliar spray when the earliest disease symptoms appear on leaves and stem. Minimum spray interval of 7 days.
Corn	Suppression of *Fusarium* and *Gibberella* ear rots (*Fusarium* spp.and *Gibberella* spp.); control of rusts (*Puccinia sorghi, Puccinia polysora*), eyespot (*Kabatiella zeae* or *Aureobasidium zeae*), grey leaf spot (*Cercospora zeaemaydis*), and northern blight (*Setosphaeria turcica*)	168[1] mL	Apply from silking (tip of stigmata visible) to silk browning (stigmata drying).

Continued

Crops, Diseases, Rates, and Timing *continued*:

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Canola; Rapeseed; Oriental mustard	Control of sclerotinia stem rot (*Sclerotinia sclerotiorum*)	126 to 147[2] mL	Apply at 20 to 50% bloom stage (prior to petal fall). Use high rate if history of heavy disease or if dense crop stand.
Chickpea	Control of ascochyta blight (*Ascochyta rabiei*)	126 to 168[2] mL	Apply at first sign of disease. Repeat applications every 10 to 14 days. Use high rate when conditions favour disease or when growing susceptible varieties.
Lentil	Control of ascochyta blight (*Ascochyta lentis*)	126 to 168[2] mL	Apply at the first sign of disease. Repeat application 10 to 14 days later. Use high rate when conditions favour disease or when growing susceptible varieties.
Flax (linseed) and Crambe	Control of sclerotinia stem rot (*Sclerotinia sclerotiorum*)	128 to 149[2] mL	Apply when the crop is in the 20 to 50% bloom stage. Best protection will be achieved when the fungicide is applied prior to petals beginning to fall, allowing the maximum number of petals to be protected. Use high rate in fields with a history of heavy disease pressure or for dense crop stands. Good coverage is essential.
Soybean	Control of Asian soybean rust (*Phakopsora pachyrhizi*) and frog-eye leaf spot (*Cercospora sojina*).	84[2] mL	Apply when first symptoms of disease can be found or that the risk of infection is imminent.

[1] Apply with non-ionic surfactant, i.e. AgSurf or Agral 90 at 0.125% v/v.

[2] May be applied with the lowest rate of non-ionic surfactant, i.e. AgSurf or Agral 90.

Application Information:

DO NOT apply during periods of dead calm or when winds are gusty. Ensure uniform coverage.

Water volumes:

Ground (all crops): Minimum of 40 L per acre.

Aerial (canola only): Minimum of 20 L per acre. Follow detailed label recommendations for aerial application.

How it Works:

The active ingredient prothioconazole is a triazole fungi-cide with broad-spectrum systemic activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None registered.

Bayer CropScience supports the following mixes that are not on the *Proline 480 SC* label. Apply mixes according to the most restrictive use limitations for either product:

Insecticides: *Decis, Lorsban, Matador, Sevin XLR*

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: Corn, flax, soybean – DO NOT exceed 1 application of this product per season. Wheat, barley, oat, canola, lentil – DO NOT exceed 2 applications of this product per season. Chickpea – DO NOT exceed 3 applications of this product per season.

Grazing: No restrictions listed.

Preharvest interval: 30 days (barley, wheat, oat); 36 days (canola, flax); 7 days (chickpea, lentil); 14 days (corn); 20 days (soybean).

Re-entry: DO NOT re-enter treated fields within 24 hours of application.

Re-cropping: May be re-planted with any crop specified on the label as soon as practical. For crops not listed, wait 30 days.

Storage: DO NOT store at temperatures below freezing. Keep in original tightly closed container and store away from feeds, seeds, fertilizer, plants and food stuffs. Keep away from sources of heat. Shake well before using if stored for more than 1 year.

Environment: Toxic to aquatic organisms. DO NOT apply directly to freshwater, estuaries or marine habitats. DO NOT contaminate bodies of water by cleaning of equipment or disposal of wastes. Observe the specified buffer zones.

Hazard Rating:

Caution – Poison.

For an explanation of the symbols used here see page 11.

Propiconazole

Fungicide Group – 3
(Refer to page 311)

Tilt 250E/Bumper 418 EC/Pivot 418 EC/Propel EC/Propel/Propiconazole Fungicide

Company:

Syngenta Canada (*Tilt 250E* – PCP#19346)

MANA Canada (*Bumper 418 EC* – PCP#28017)

Interprovincial Cooperative Ltd. (*Pivot 418 EC* – PCP#28219)

Viterra (*Propel* - PCP#29548)

Nufarm Agriculture Inc (*Propiconazole Fungicide* – PCP#30367)

Formulations:

Tilt 250E - 250 g per L propiconazole formulated as an emulsifiable concentrate. Container sizes - 2 x 8L and 4 x 5 L.

Bumper 418 EC - 418 g per L propiconazole formulated as an emulsifiable concentrate. Container size - 4.8 L.

Pivot 418 EC - 418 g per L propiconazole formulated as an emulsifiable concentrate. Container size - 2 x 4.8L.

Propel - 250 g per L propiconazole formulated as an emulsifiable concentrate. Container size - 8L.

Propiconazole Funigicide - 418 g per L propiconazole formulated as an emulsifiable concentrate. Container size - 4.8L.

Crops, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rates (per acre):		Application Timing:
		Tilt 250E ***Propel***	***Bumper 418 EC*** ***Pivot 418 EC*** ***Propiconazole Fungicide***	
Wheat (durum, winter wheat, spring wheat) Barley	Septoria leaf spot (*Septoria* sp.) and tan spot (*Pyrenophora tritici- repentis*) ** Net blotch (*Pyrenophora teres*) **	100 mL	60 mL	An early application of the low product rate can be timed with herbicide application. At growth stage (G.S.) 12 to 23, 100 ml per acre (*Tilt* or *Propel*) or 60 ml per acre (*Bumper*) may be applied for early season disease suppression under normal field conditions. At this stage, if there is a history of high disease pressure in the field and/or if field conditions favour disease development use the full-rate fungicide application (200 ml per acre for *Tilt* or *Propel;* 120 ml per acre for *Bumper*). This rate can also be used to suppress disease at later growth stages (G.S. 29-55).

Continued

Crops, Diseases, Rates and Timing *continued*:

Crop:	**Diseases:**	**Application Rates (per acre):**		**Application Timing:**
		Tilt 250E ***Propel***	***Bumper 418 EC*** ***Pivot 418 EC*** ***Propiconazole Fungicide***	
Wheat (durum, winter wheat, spring wheat)	Septoria leaf spot (*Septoria* sp.), tan spot (*Pyrenophora tritici- repentis*), septoria glume blotch, stripe rust (*Puccinia striiformis*), leaf rust (*Puccinia triticina*), stem rust (*Puccinia graminis*) and powdery mildew (*Erysiphe graminis* f. sp. *tritici*)	200 mL	120 mL	Application may be made at the very early stage of disease (during tillering or stem elongation). The product lasts about 3 weeks in the plant, so another application will be necessary if disease pressure continues. Make the 2nd application up to when the head is half-emerged.
Barley	Spot blotch (*Cochliobolus sativus*), net blotch (*Pyrenophora teres*), scald (*Rhynchosporium secalis*), leaf rust (*Puccinia hordei*), stem rust (*Puccinia graminis*), septoria leaf spot (*Septoria* sp.) and powdery mildew (*Blumeria graminis*)			
Oat	Septoria leaf blotch (*Septoria avenae*) and crown rust (*Puccinia coronata*)			
Canaryseed*	Septoria leaf mottle (*Septoria triseti*) **	200 mL	120 mL	Apply only once at flag leaf emergence.
Corn	Rust (*Puccinia sorghi*)	200 mL	120 mL	Apply when rust pustules first appear; make 2nd application 14 days later.
	Northern leaf blight (*Setosphaeria turcicum*)	100 to 200 mL	60 to 120 mL	Apply when disease first appears. Use low rate if disease pressure is low.
Canola	Blackleg (*Leptosphaeria maculans*)	200 mL	120 mL	Apply during the rosette stage (after second true leaf and prior to bolting).
Bean	Rust (*Uromyces* spp.)	200 mL	120 mL	Apply when disease first appears; make 2nd application 14 to 21 days later.
Soybean* (grown for seed)	Frogeye leaf spot (*Cercospora sojina*)	200 to 300 mL	120 to 182 mL	Apply when disease first appears; make 2nd application 14 days later if severe disease pressure exists.

Continued

Crops, Diseases, Rates and Timing *continued*:

Crop:	**Diseases:**	**Application Rates (per acre):**		**Application Timing:**
		Tilt 250E ***Propel***	***Bumper 418 EC*** ***Pivot 418 EC*** ***Propiconazole Fungicide***	
Legume*** (soybean, bean, lentil, pea, chickpea)	Asian soybean rust (*Phakopsora pachyrhizi*)	200 to 300 mL	-	Apply at the first sign of rust; make 2nd application 14 days later if disease continues.
	Powdery mildew (*Microsphaera diffusa, Erysiphe pisi, E. polygoni*)	200 mL	-	
Timothy *†	Purple eyespot (*Cladosporium phlei*)	200 mL	120 mL	Apply at the first sign of disease (usually at the beginning of flowering). Can be applied up to full flowering. Spray interval of 14 days.

* Ground application only.

** Suppression only.

*** Only *TILT 250E* and *Propel* are registered for use on these crops.

† Only *TILT 250E*, *Pivot 418 EC* and *Propel* are registered for use on this crop.

Application Information:

Water Volume:

Ground: Minimum 80 L per acre

Aerial: 16 to 20 L per acre

How it Works:

The active ingredient propiconazole is a triazole fungicide with broad spectrum systemic activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Herbicides: In wheat and barley only, propiconazole may be tank-mixed with one of the following: *2,4-D amine, Estemine 2,4-D, MCPA amine, Estemine MCPA, Buctril-M* or *Pardner* and in wheat only, may be applied with *Horizon 240EC*. In wheat and barley only, *Pivot 418 EC* may be tank-mixed with *Logic M* or *Brotex 240; Pivot 418 EC,Bumper 418 EC*, or *Propiconazole Fungicide* may be tank-mixed with *Badge* or *Bromotril 240 EC*. In spring wheat and barley only, *Tilt 250E* or *Propel* may be tank-mixed with *Axial 100EC*. Refer to labels for tank-mix precautions.

Fertilizers: Propiconazole may be applied with up to 4 kg per acre (9 lb per acre) of actual nitrogen. The appropriate amount of urea can be dissolved in water and added to the spray tank before adding the fungicide. Excessive nitrogen or application during hot weather may result in crop injury. DO NOT add nitrogen when tank-mixing propiconazole with a herbicide.

Insecticides: In field corn, propiconazole can be tank-mixed with one of the following: *Matador 120EC/Silencer 120EC* or *Ripcord*. In legumes, *Tilt 250E* or *Propel* can be tank-mixed with *Matador 120EC*.

Fungicides: For control of Asian soybean rust in legumes, *Tilt 250E* or *Propel* can be tank-mixed with *Quadris*. *Tilt 250E* or *Propel* may be tank-mixed with *Quadris* in wheat and barley. Consult each label for diseases controlled and appropriate timing.

Note: Syngenta supports the following mixes that are not on the respective labels. Apply mixes according to the most restrictive use limitations for either product:

***Propel* Tank Mixes:**

Herbicides: *Axial, Broadband, Horizon NG, Touchdown Total, Traxion*

***Tilt* Tank Mixes:**

Herbicides: *Liberty, Sierra 2.0, Touchdown Total, Traxion*, a ½ rate of *Tilt* may also be tank mixed with *Broadband*.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: Wheat, barley, corn, bean, legume, timothy – DO NOT exceed 2 applications of this product per season.

Grazing: DO NOT graze animals on treated green crops within 3 days of application. DO NOT feed straw treated with herbicide tank mixes to livestock. DO NOT use treated soybean seed for animal feed.

Preharvest interval: Wheat, oats, barley - 45 days. Canola - 60 days. Corn - 14 days if tank-mixed with an insecticide. Soybeans - 50 days. Beans - 28 days. Timothy - 14 days.

Re-entry: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: DO NOT freeze. Store products away from food or feed.

Environment: Toxic to aquatic organisms. DO NOT contaminate any body of water by direct application, drift or by cleaning equipment.

Hazard Rating:

◈ Warning – Poison (*Bumper 418 EC, Pivot 418 EC, Propiconazole Fungicide*).

▽ Caution – Poison (*Tilt 250 EC, Propel*).

◇ Warning – Eye and Skin Irritant.
Potential Skin Sensitizer.

For an explanation of the symbols used here see page 11.

Prosaro 250 EC

Fungicide Group – 3
(Refer to page 311)

Company:

Bayer CropScience - PCP#29821

Formulation:

125 g per L prothioconazole + 125 g per L tebuconazole, formulated as an emulsifiable concentrate.

Container size – 6.5 litres.

Crops, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Barley; Wheat	Suppression of fusarium head blight (*Fusarium* spp.)	324 mL	**Barley:** Apply as a preventative spray within the time period when 70 to 100% of barley heads on the main stem are fully emerged to 3 days after full head emergence. **Wheat:** Apply as a preventative spray within the time period from when at least 75% of wheat heads on the main stem are fully emerged to when 50% of heads on the main stem are in flower.
Barley	Control of net blotch (*Pyrenophora teres*); scald (*Rhynchosporium secalis*); spot blotch (*Cochliobolus sativus*), leaf blotch (*Septoria passerinii*), leaf, stem, and stripe rusts (*Puccinia hordei, P. graminis, P. striiformis*), powdery mildew (*Erysiphe graminis*)		
Wheat	Control of leaf and glume blotch (*Septoria tritici, Stagonospora nodorum*), tan spot (*Pyrenophora tritici-repentis*); leaf, stem, and stripe rusts (*Puccinia recondite, P. graminis, P. striiformis*), powdery mildew (*Erysiphe graminis*)		

Application Information:

DO NOT apply during periods of dead calm or when winds are gusty. Ensure uniform coverage.

Water Volume:

Ground: Minimum of 40 L per acre.

Aerial: Minimum of 20 L per acre. Follow detailed label recommendations for aerial application.

How it Works:

The active ingredients prothioconazole and tebuconazole are demethylation inhibitors with broad-spectrum systemic activity. To be used as a preventative fungicide application. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes

None registered.

Bayer CropScience supports the following mixes that are not on the *Prosaro 250 EC* label. Apply mixes according to the most restrictive use limitations for either product:

Insecticides: *Lorsban*

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT exceed 1 application of this product per season.

Grazing: DO NOT allow livestock to graze or feed green forage to livestock prior to 6 days after treatment with *Prosaro 250 EC* fungicide. Straw cut after harvest may be fed or used for bedding.

Preharvest interval: 36 days.

Re-entry: DO NOT re-enter treated fields until 12 hours post- application.

Re-cropping: Treated areas may be replanted with any crop specified on the label as soon as practical after application. For oat and soybean, DO NOT plant back within 30 days of application. For all other crops, DO NOT plant back until 120 days after application. Tebuconazole is persistent and will carryover. It is recommended that any products containing tebuconazole not be used in areas treated with this product during the previous season.

Storage: DO NOT store in or around the home. DO NOT store at temperatures below freezing. Keep in original tightly closed container and store away from feeds, seeds, fertilizer, plants and food stuffs. Keep away from sources of heat. Shake well before using if stored for more than 1 year. DO NOT contaminate water, food, or feed by storage or disposal.

Environmental: Toxic to birds, small wild animals, aquatic organisms, and non-target plants. As this product is not registered for the control of pests in aquatic systems, DO NOT use to control aquatic pests. DO NOT apply to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Runoff is hazardous to aquatic organisms in neighbouring areas. To reduce runoff from treated areas into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil, or clay. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body. Follow buffer zones as per the product label.

Hazard Rating:

☠ Danger Eye irritant.

⚠ Caution – Skin irritant

For an explanation of the symbols used here see page 11.

Quadris (2013)

See Azoxystrobin on page 323.

Quash

Fungicide Group – 3

(Refer to page 311)

Company:

Valent Canada – PCP#30402

Formulation:

50.0% metconazole formulated as water dispersible granules. Container sizes – Pouch (2 x 280g)

Crops, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rate (per acre):	Application Timing:
Canola	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	113 g	Make a single, preventative application between 20% and 50% bloom.
Dry bean	Suppression of white mould (*Sclerotinia sclerotiorum*)		Apply prior to disease development. Make first application at 20-50% bloom stage, before disease symptoms are visible. Make second application at full bloom. Do not make the second application until 9 days have passed since the first application.
Field pea	Powdery mildew (*Erysiphe pisi*), suppression of white mould (*Sclerotinia sclerotiorum*)		
Chickpea Lentil	Suppression of Ascochyta blight (*Ascochyta rabiei*), suppression of white mould (*Sclerotinia sclerotiorum*)		
Potato	Early blight (*Alternaria solani*)	71-113 g	Apply prior to infection for preventative control. If conditions are favourable for disease development, make additional applications at 7 to 10 day intervals.

Application Information:

DO NOT apply during periods of dead calm or when winds are gusty. Ensure uniform coverage.

Water Volume:

Ground: Minimum of 80 L per acre.

Aerial: Minimum of 20 L per acre.

Consult nozzle manufacturers for specific nozzle and pressure recommendations. Ensure thorough coverage for optimal disease control/suppression.

How it Works:

The active ingredient metconazole is a broad spectrum triazole demethylation inhibitor (DMI) fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes

None registered.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: Canola – DO NOT exceed 1 application of this product per season. Dry bean, field pea, chickpea, lentil – DO NOT exceed 2 applications of this product per season. Potato – DO NOT exceed 3 applications of this product per season at the high rate, DO NOT exceed 4 applications of this product per season at the low rate.

Grazing: No restrictions listed.

Preharvest interval: Potato – 1 day; Dry bean, field pea, chickpea, lentil – 21 days; Canola – 45 days.

Re-entry: Potato – DO NOT re-enter treated areas within 12 hours of application. Canola – DO NOT re-enter treated areas within 6 days of application. Dry bean, field pea, chickpea, lentil – DO NOT re-enter treated areas within 9 days of application.

Re-cropping: A plant back interval of 30 days is required for all crops not listed on the Quash label.

Storage: Store in original tightly closed container. Protect from freezing. Store in cool, dry place. Store this product away from food or feed.

Environment: Avoid run-off from treated areas into aquatic areas. Toxic to aquatic organisms, non-target terrestrial plants and small wild animals.

Hazard Rating:

☠ Caution – Poison

Check label for first-aid information.

For an explanation of the symbols used here see page 11.

Quilt

Fungicide Group – 3, 11
(Refer to page 311)

Company:

Syngenta Canada – PCP#28328

Formulations:

75 g per L azoxystrobin and 125 g per L propiconazole.

Contains 0.03% 1,2-benzisothiazolin-3-one as a preservative.

Container size – 2 x 10.125 L case and 101.25 tote.

Crops, Diseases, Rates and Timing:

Crop:	Diseases Controlled:	Application Rate (per acre):	Application Timing:
Soybeans; Legume vegetables, including: Bean Chickpea Field pea Lentil	Asian (soybean) rust (*Phakopsora pachyrhyizi*)	405 to 607 mL	Make the first application at the first sign of disease. Apply the high rate only under conditions of high disease pressure. A second application at a 14 day interval may be needed if conditions persist. It is important to protect the developing pod of soybean and podded legume vegetables.
	Powdery mildew (*Microsphaera diffusa, Erysiphe pisi, E. polygoni*) Mycosphaerella blight (*Mycosphaerella pinodes*) on peas	405 mL	
Lentil Soybean	Anthracnose (*Colletotrichum truncatum*)	405 to 607 mL	Make the first application at the first sign of disease. A second application at 14 days interval may be needed if conditions persist. Good spray coverage and canopy penetration are important for best results.
Soybean	Frogeye leaf spot (*Cercospora sojina*)	405 to 607 mL	Make the first application at growth stage R3 (early pod set) and make a second application 14 days later at approximately growth stage R5.
Barley (B) Wheat (W) Spring Wheat (SW) Winter Wheat (WW)	Net blotch (*Pyrenophora teres*) (B); Scald (*Rhynchosporium secalis*) (B); Septoria leaf spot (*Septoria* sp.) (B & W); Tan spot (*Pyrenophora tritici-repentis*) (W) Stripe rust (*Puccinia striiformis*) (B, SW & WW); Wheat leaf rust (*Puccinia triticina*) (SW & WW).	304 mL	Apply once between stem elongation and half-head emergence. When disease pressure from stripe rust or wheat leaf rust is expected to be high, the 405 ml per acre application rate should be used. Please note which crops (abbreviations in brackets) correspond to each disease controlled by product.
	Stripe rust (*Puccinia striiformis*) (B, SW & WW); Wheat leaf rust (*Puccinia triticina*) (SW & WW).	304 to 405 mL	
	Barley leaf rust (*Puccinia hordei*) (B)	405 mL	

Continued

Crops, Disease, Rates and Timing *continued*:

Crop:	Diseases Controlled:	Application Rate (per acre):	Application Timing:
Field, Sweet, and Popping Corn (including seed production)	Rust (*Puccinia sorghi*); Northern corn leaf blight (*Setosphaeria turcicum*); Southern corn leaf blight (*Cochliobolus heterostrophus*); Eye spot (*Aureobasidium zeae*); Grey leafspot (*Cercospora zeae-maydis*)	304 to 405 mL	Make first application at the first sign of disease, followed by a second application 14 days after the first, if environmental conditions are favourable for disease development.

Application Information:

Water Volume:

Ground: Apply in a minimum of 18 L of water per acre for legume vegetables and soybean. Apply in a minimum of 40 L of water per acre for other crops.

Aerial: Apply in a minimum of 18 L of water per acre.

How it Works:

The active ingredient azoxystrobin is a methoxyacrylate compound (strobilurin) with broad spectrum contact and systemic activity. The active ingredient propiconazole is a triazole fungicide with broad-spectrum systemic activity. To be used as a preventative and curative fungicide application. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: *Quilt* can be tank-mixed with insecticide *Matador 120EC* for foliar disease and insect control in cereals. Consult each label for pests controlled, precautions, and specific application instructions

Fungicides: None registered.

Note: Syngenta supports the following mixes that are not on the *Quilt* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides: *Axial, Broadband* + registered tank mixes, *Horizon NG, Sierra, Touchdown Total, Traxion*

Fungicides: *Quadris*

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: Barley, wheat – DO NOT exceed 1 application of this product per season. Soybean, bean, chickpea, field pea, lentil, corn – DO NOT exceed 2 applications of this product per season.

Preharvest interval: 30 days (soybeans and dry legume vegetables); 15 days (succulent podded and shelled legume vegetables); 14 days (soybean hay and dry pea hay); 45 days (wheat and barley); 14 days (field corn, sweet corn, and popcorn).

Re-entry: DO NOT re-enter treated fields until 12 hours post-application.

Re-cropping: Oats and rye may be planted 45 days after *Quilt* application. DO NOT plant any other crop intended for food, grazing, or any component of animal feed or bedding within 105 days of *Quilt* application to the preceding crop unless the second crop appears on the *Quilt* label.

Storage: Store in a cool, dry, well ventilated area away from feed and foodstuffs, and out of reach of children and animals. DO NOT store at temperatures below freezing. Keep in original container, tightly closed, during storage.

Environment: Azoxystrobin is persistent and will carry over. *Quilt* is toxic to aquatic organisms and is extremely phytotoxic to certain apple varieties. Avoid spraying when the wind is blowing towards a nearby sensitive crop, garden, terrestrial habitat (such as shelter-belt), or aquatic habitat. DO NOT contaminate irrigation or drinking water supplies by cleaning of equipment or disposal of wastes. Avoiding spray drift is the responsibility of the applicator.

Hazard Rating:

☠ Caution – Poison and skin irritant

For an explanation of the symbols used here see page 11.

Ranman 400SC (2013)

See Cyazofamid on page 335.

Reason 500SC

Fungicide Group – 11
(Refer to page 311)

Company:

Bayer CropScience – PCP#27462

Formulation:

500 g per L fenamidone formulated as a suspension concentrate. Container sizes - 2, 4 or 10 L.

Crops, Diseases and Timing:

Control of early blight (*Alternaria solani*) and late blight (*Phytophthora infestans*) on potato. Begin application when plants are 15 to 20 cm high or when disease threatens. Apply a fungicide with a different mode of action within 7 to 10 days after each application using the shorter interval when conditions favor disease development. Ensure even application.

Rates:

Apply at 80 mL per acre as a tank mix with either *Dithane DG** at 500 g per acre or *Bravo 500* at 500 mL per acre.

*When using other formulations of mancozeb, adjust application rates to apply 375 g active ingredient per acre.

Application Information:

Water Volume:

Aerial: Use minimum of 14 L per acre at a pressure no less than 300kPa.

How it Works:

The active ingredient fenamidone is a strobilurin fungicide with contact activity. To be used as a preventative and inhibitive (spore germination and antisporulant) fungicide application. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: To be applied ONLY as a tank-mix with mancozeb fungicides or *Bravo 500*. Follow mixing instructions provided on the label.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT exceed 6 applications or 0.48 L per acre of this product per season.

Grazing: No restrictions listed.

Preharvest interval: 14 days.

Re-entry: DO NOT re-enter treated areas until residues have dried.

Re-cropping: A 30 day plant-back interval is required for potato and all other crops.

Storage: DO NOT allow product to freeze. If stored more than 1 year, shake well before using. Keep away from fire, open flame or other sources of heat. Store in tightly closed container away from fertilizer, seeds, feed or food

Environment: For ground application maintain an 8 m buffer zone between areas sprayed and aquatic systems. For aerial application allow a 10m buffer. Toxic to fish and other aquatic organisms; DO NOT apply where runoff is likely to occur.

Hazard Rating:

☠ Caution Poison – Eye Irritant.

For an explanation of the symbols used here see page 11.

Regalia Maxx

Fungicide Group – Not classified, bio-fungicide

(Refer to page 311)

Company:

Marrone Bio Innovations – PCP#30199

Distributed by Engage Agro Corporation

Formulation:

20% extract of *Reynoutria sachalinensis* formulated as a liquid concentrate.

Container size – 4 x 5 L

Crops, Diseases and Timing:

Partial suppression of septoria leaf spot (*Septoria tritici*) in wheat. Apply preventatively or when disease systems first appear after initial jointing. Repeat applications in 7 to 14 day intervals depending upon crop growth and disease pressure.

Rates:

0.10% v/v in 160 to 240 L of water per acre.

Application Information:

DO NOT apply by air. When environmental conditions and plant stage are conducive to rapid disease development use *Regalia Maxx* in a rotational program with other registered fungicides.

Water Volume:

Ground: Minimum of 160 to 240 L per acre

How it Works:

Reynoutria sachalinensis is a plant extract to induce the plants' natural defense mechanisms against certain fungal and bacterial disease. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None registered.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: Do NOT exceed 3 applications of this product per season.

Grazing: No restrictions listed.

Preharvest Interval: May be applied up to the day of harvest.

Re-entry: DO NOT re-enter into treated areas until the spray is dried.

Re-cropping: No restrictions listed.

Storage: Store in original tightly closed container.

Environmental Hazards: DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Hazard Rating:

None.

Revus

Fungicide Group – 40
(Refer to page 311)

Company:

Syngenta Canada – PCP#29074

Formulation:

250 g per L mandipropamid. Container size – 4 x 3.78 L.

Crops, Diseases and Timing

Control of late blight (*Phytophthora infestans*) on potato. Begin applications prior to disease development. Continue applications on 7 to 10 day intervals, following resistance management guidelines.

Rates:

0.16 to 0.24 L per acre. The use of a non-ionic adjuvant (0.125% v/v) is recommended.

Application Information:

Water Volume:

Ground: Use a minimum water volume of 40 L per acre. In situations where dense canopy or pest pressure is high, use greater water volumes.

Aerial: Use a minimum water volume of 18 L per acre.

Nozzles: DO NOT apply using any type of ultra low volume (ULV) spray system.

How it Works:

The active ingredient mandipropamid is a carboxylic acid amide (CAA) fungicide with contact and systemic activity. To be used as a preventative and inhibitive (prevents spore germination) fungicide application. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

May be tank mixed with *Bravo 500*.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT exceed 4 applications of this product per season.

Grazing: No restrictions listed.

Preharvest interval: 14 days.

Re-entry: DO NOT re-enter treated area within 12 hours of application.

Re-cropping: DO NOT plant any crop which is not registered for use with *Revus* for a period of 30 days after the last application.

Storage: Store in a cool dry place away from food, beverages, and tobacco products.

Environment: To reduce runoff into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil, or clay. Runoff into aquatic habitats may be reduced by including a vegetative strip between the treated area and the edge of the water body.

Hazard Rating:

☠ Caution – Poison.

◇ Warning – Skin Irritant.
Potential Skin Sensitizer.

For an explanation of the symbols used here see page 11.

Revus Top

Fungicide Group – 3, 40
(Refer to page 311)

Revus Top* is a co-pack of *Revus Fungicide* (mandipropamid, page 363) and *Inspire Fungicide* (difenoconazole, page 341). Information listed is restricted to *crop, diseases, rates, cost. For other detailed information on the component products see the product pages listed above.

Company:

Syngenta Canada

Formulation:

Revus Top has two components:

***Revus* (PCP #29074):** 250 g per L mandipropamid formulated as a suspension
***Inspire* (PCP #30004):** 250 g per L difenoconazole as an emulsifiable concentrate
See the component products for other information. Use the most stringent restrictions for either product.

Container size: 2x3.78 L of *Revus* + 2x3.78 L of *Inspire*

Crops, Diseases and Timing:

Control of early blight (*Alternaria solani*) and late blight (*Phytophthora infestans*) on potato. Begin applications prior to late blight development, at early stages of early blight, or when conditions are conducive for development of either disease.

Rates:

0.16 to 0.24 L per acre of *Revus*.

0.12 to 0.21 L per acre of *Inspire*.

See pages listed above for recommendations of resistance management and the maximum number of applications per season. Follow the most stringent restrictions for either product.

Hazard Rating:

⚠ Caution – Eye and skin irritant.

☠ Caution – Poison.

Check label for first aid information.

For an explanation of the symbols used here see page 11.

Ridomil Gold/Bravo, Ridomil Gold SL/Bravo, Ridomil Gold 480EC, Ridomil Gold 480SL

Fungicide Group
Ridomil Gold/Bravo,
Ridomil Gold SL/Bravo - 4, M5
Ridomil Gold 480EC,
Ridomil Gold 480SL - 4
(Refer to page 311)

Company:

Syngenta Canada
(*Ridomil Gold/Bravo* – PCP#26443;
Ridomil Gold SL/Bravo – PCP#29239;
Ridomil Gold 480EC – PCP#25384;
Ridomil Gold 480SL – PCP#28474)

Formulation:

Ridomil Gold/Bravo - 500 g per L chlorothalonil and 480 g per L metalaxyl-M. Container size 8.83 L jug twin-pak.

Ridomil Gold SL/Bravo - 500 g per L chlorothalonil and 480 g per L metalaxyl-M formulated as a soluble concentrate. Container size - 8.83 L jug twin-pak.

Ridomil Gold 480EC - 480 g per L metalaxyl-M formulated as an emulsifiable concentrate. Container size - 4 x 3.78 L jugs.

Ridomil Gold 480SL - 480 g per L metalaxyl-M formulated as a soluble concentrate. Container size - 10 x 0.5 L or 4 x 3.78 L jugs.

Crops, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rate:	Application Timing:
Potato	***Ridomil Gold/Bravo, Ridomil Gold SL/Bravo:*** Early blight (*Alternaria solani*), late blight (*Phytophthora infestans*), late blight tuber rot, Botrytis vine rot (*Botrytis cinerea*). Suppression of Pythium leak (*Pythium* spp.)and pink rot (*Phytophthora erythroseptica*)	***Ridomil Gold/Bravo, Ridomil Gold SL/Bravo:*** One 8.83 L jug treats 10 acres. The entire contents of the jug must be added to the spray tank or an improper mixture will result.	Begin preventive applications early in the season when conditions are favorable for disease (before infection), no later than when the plant foliage meets within the row uniformly across the field. Apply a second and third application at 14 day intervals. Other registered contact fungicides should be applied 7 days after each application.
	Ridomil Gold 480EC, Ridomil Gold 480SL: Suppression of pink rot (*Phytophthora erythroseptica*) as in-furrow treatment.	***Ridomil Gold 480EC, Ridomil Gold 480SL:*** 4 mL per 100 m row, applied in-furrow at planting.	

Application Information:

Water Volume:

Ground: use sufficient water to ensure thorough coverage of foliage. Use a water volume of 90 to 640 L per acre.

In-furrow treatment: use a minimum of 12 L per acre. For tank mixes with *Quadris* water volume should be 20 to 56 L per acre.

Aerial: use a minimum water volume of 20 L per acre.

How it Works:

The active ingredient metalaxyl is an acylalanine fungicide with systemic activity. The active ingredient chlorothalonil is a chloronitrile fungicide with contact activity. To be used as a preventative fungicide application. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Ridomil Gold/Bravo, Ridomil Gold SL/Bravo - None registered.

Ridomil Gold 480EC, Ridomil Gold 480SL - May be tank mixed with *Quadris* for in-furrow treatment to control Rhizoctonia stem rot, stolon canker, black scurf and suppression of pink rot.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: Ground / aerial (*Ridomil Gold/Bravo, Ridomil Gold/SL Bravo*) - DO NOT exceed 3 applications of this product per season. In-furrow (*Ridomil Gold 480EC, Ridomil Gold 480SL*) – DO NOT exceed 1 application of this product per season.

Grazing: No restrictions listed.

Preharvest interval: 80 days for in-furrow application.

Re-entry: *Ridomil Gold 480EC, Ridomil Gold 480SL* – DO NOT re-enter treated areas within 12 hours of application.

Re-cropping: A plant back interval of 30 days for root crops is required after the in-furrow application.

Storage: Protect from excessive heat.

Environment: DO NOT apply where runoff is likely to occur. DO NOT use on coarse textured gravelly soils, soils with less than 2% organic matter or in areas where the water table may be high. Avoid application by ground or air near or around bodies of water. DO NOT contaminate streams or ponds by spray drift, by cleaning equipment, or disposal of wastes. A buffer zone of 100 m for aerial application and 15 m for ground application should be observed to protect water bodies.

Hazard Rating:

Ridomil Gold/Bravo, Ridomil Gold SL/Bravo

☠ Warning Poison – Eye irritant.

Ridomil Gold 480EC

☠ Caution Poison. Warning – Eye irritant.

Ridomil Gold 480SL

☠ Caution Poison. Warning – Eye irritant, skin irritant.

For an explanation of the symbols used here see page 11.

Rovral Flo/Rx (2011)

See Iprodione on page 342.

Scala SC

Fungicide Group – 9
(Refer to page 311)

Company:

Bayer CropScience – PCP#28011

Formulation:

400 g per L pyrimethanil formulated as a flowable concentrate. Container size - 2 L.

Crops, Diseases and Timing:

Control of early blight (*Alternaria solani*) on potato. Apply when plants are 15 to 20 cm high or when disease threatens. Repeat applications at 7 to 14 day intervals or as necessary to maintain disease control. If severe disease conditions exist, use the 7 day interval. Minimum spray interval is 7 days. Ensure complete coverage.

Rates:

Apply at 300 mL per acre as a tank mix with *Bravo 500*.

Application Information:

Water Volume:

Ground: Minimum of 120 L per acre

Aerial: Minimum of 14 L per acre

How it Works:

The active ingredient pyrimethanil is a anilinopyrimidine fungicide with contact and systemic activity. To be used as a preventative fungicide application. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: To be applied ONLY as a tank mix with *Bravo 500*. Follow mixing instructions provided on the label.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT exceed 6 applications or 2.4 L per acre of this product per season.

Grazing: No restrictions listed.

Preharvest interval: 7 days.

Re-entry: DO NOT re-enter treated areas within 12 hours of application.

Re-cropping: A 30 day plant-back interval is required for potatoes and wheat and 130 days for all other crops.

Storage: DO NOT allow product to freeze. If stored more than 1 year, shake well before using. Store in tightly closed container away from fertilizer, seeds, feed or food.

Environment: Maintain a 1 m buffer zone between areas sprayed and aquatic systems. Toxic to aquatic organisms; DO NOT apply where runoff is likely to occur.

Hazard Rating:

▽ Caution Poison – Skin Irritant.

For an explanation of the symbols used here see page 11.

Senator 70WP

Fungicide Group – 1
(Refer to page 311)

Company:

Nippon Soda Company Ltd. – PCP#25343
Distributed by Engage Agro Corporation

Formulation:

70% thiophanate-methyl formulated as wettable powder.

Container size - 2 kg.

Crops, Diseases and Timing:

Control of sclerotinia (white mould) (*Sclerotinia sclerotiorum*) on white beans. Apply when conditions favour disease (i.e. warm, humid weather and heavy, dense foliage), usually during early bloom stage and prior to rows closing in. If conditions favouring disease persist, repeat applications may be warranted.

Rates:

0.7 to 0.9 kg per acre (one container treats 1.67 to 2.14 acres)

Application Information:

Water Volume:

Ground: 400 L per acre.

Aerial: 20 to 24 L per acre.

How it Works:

The active ingredient thiophanate-methyl is a methylbenzimidazole carbamate fungicide with systemic activity. To be used as a preventative fungicide application. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed. *Senator 70WP* is compatible with most pesticides; DO NOT mix with lime or other alkaline materials.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: No restrictions listed.

Grazing: DO NOT feed or allow livestock to graze on treated crops.

Preharvest interval: No restrictions listed.

Re-entry: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: Store in a dry place.

Environment: DO NOT apply to any body of water. Avoid drifting of spray onto any body of water or non-target areas. Specified buffer zones should be observed.

Hazard Rating:

None listed.

Serenade Max/Serenade ASO

Fungicide Group – 44
(Refer to page 311)

Company:

AgraQuest Inc., distributed by United Agri Products

Formulation:

Serenade Max: PCP#28549 - 14.6% *Bacillus subtilis* (QST 713 strain) formulated as a wettable powder. Container size - 5.44 kg.

Serenade ASO: PCP#28626 - 1.34% *Bacillus subtilis* (QST 713 strain) formulated as an aqueous suspension. Container size - 2 x 9.46 L per case, 500 L and 1000L tote.

Crops, Diseases, Rates and Timing:

Crop:	Diseases Suppressed:	Application Rate (Per Acre)		Application Timing:
		Serenade Max	*Serenade ASO*	
Bean, chickpea, lentil, pea (all types)	White mould or stem rot *(Sclerotinia sclerotiorum)*; Botrytis blight or pod rot *(Botrytis cinerea)*	1.2 to 2.4 kg	1.6 to 6.1 L	Product should be applied prior to or in the early stages of disease development; repeat applications on 7 to 10 day intervals if conditions for disease persist. Use maximum label rates and shortened spray intervals for conditions conducive to rapid disease development. When conditions are conducive to heavy disease pressure, use in a rotational program with other registered fungicides.
Soybean	Sclerotinia stem rot *(Sclerotinia sclerotiorum)*			Begin application soon after emergence and when conditions are conducive to disease development. Repeat as necessary on a 7 to 10 day interval.
	Brown spot *(Septoria glycines)* Frogeye *(Cercospora sojina)*			
Root and tuber crops - including Potato	White mould *(Sclerotinia sclerotiorum)* Also Potato early blight *(Alternaria solani)*	1.2 to 2.4 kg	3.2 to 6.1 L	Begin application soon after emergence and when conditions are conducive to disease development. Repeat as necessary on a 7 to 10 day interval.
Canola	Sclerotinia stem rot *(Sclerotinia sclerotiorum)*	0.1 to 0.4 kg	0.4 to 1.6 L	Begin application at 20% to 30% bloom. A second application may be made 7 to 10 days later, at approximately 50% bloom and prior to significant petal fall, if conditions for disease development remain favourable. Use higher rates in fields with a history of heavy disease pressure.

Application Information:

Water Volume:

Use water volumes to give good canopy penetration and coverage of plant parts to be protected.

Ground application only for all crops, except canola (ground or air).

How it Works:

Bacillus subtilis is a bacterium that works as a bio-fungicide to prevent infection of labeled diseases by multi-site biochemical activity. For more information refer to "Fungicide Modes of Action" on page 296.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: No restrictions listed.

Grazing: No restrictions listed.

Preharvest interval: Can be applied up to and including the day of harvest.

Re-entry: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: Maximum storage period of two years at room temperatures up to 25°C. Store in a dry area inaccessible to children. Store in original container.

Environment: DO NOT contaminate water, food, or feed by storage and disposal.

Hazard Rating:

None listed.

Potential skin sensitizer.

Stratego 250EC

Fungicide Group – 3, 11
(Refer to page 311)

Company:

Bayer CropScience - PCP#27528

Formulation:

125 g per L propiconazole and 125 g per L trifloxystrobin formulated as an emulsifiable concentrate. Container size - 8.1 L and 129.6 L.

Crops, Disease, Rates and Timing:

Crop:	Diseases Controlled:	Application Rate (per acre):	Application Timing:
Spring wheat (including durum); Winter wheat	Septoria leaf blotch (*Septoria* sp.), tan spot (*Pyrenophora tritici-repentis*), powdery mildew (*Erysiphe graminis* f. sp. *tritici*), leaf rust (*Puccinia triticina*), stem rust (*Puccinia graminis*) and stripe rust (*Puccinia striiformis*)	202 mL	Apply at the very early stages of disease development. Typically, one application from tillering up to flag leaf emergence is required. **Single application:** 4-leaf stage up to early heading (GS 14 to 55). **Two applications:** First at 4-leaf to flag leaf stage. Second before early heading but not within 14 days of first application.
Barley	Net blotch (*Pyrenophora teres*), scald (*Rhynchosporium secalis*), septoria leaf blotch (*Septoria* sp.) and spot blotch (*Cochliobolus sativus*)	202 mL	
Oat	Crown rust (*Puccinia coronata*) and septoria leaf blotch (*Septoria avenae*)	202 mL	
Soybean	Asian Soybean Rust (*Phakopsora pachyrhyizi*) and Frogeye leaf spot (*Cercospora sojina*)	202 mL	Begin applications preventatively from early flowering (R1) to complete pod fill (R5) when risk of rust infection is high. Spray between R3 and R4 (early pod fill) or when first symptoms occur for frogeye leaf spot.

Application Information:

Water Volume:

Ground: 40 to 80 L per acre

Air: Minimum of 20 L per acre

How it Works:

The active ingredient propiconazole is a triazole fungicide with broad spectrum systemic activity.

The active ingredient trifloxystrobin is a strobilurin fungicide with broad spectrum preventative activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Herbicides: Follow the labels for the tank mix partner(s) regarding directions of use, restrictions and precautions. For the control of early season leaf disease and weeds on the respective labels, *Stratego 250EC* can be tank-mixed with one of the following:

Winter, spring and durum wheat - *Buctril M*
Spring and durum wheat – *Buctril M* + *Puma*^{120} *Super* or *Buctril M* + *Puma Advance* or *Puma*^{120} *Super* + *Refine Extra* or *Puma Advance* + *Refine SG*
Winter and spring wheat – *Infinity*
Spring wheat – *Puma Advance* + *Infinity* or *Velocity M3 Tank Mix* (*Velocity A* + *Velocity B*) or *Velocity* + *Velocity 2*
Barley – *Puma*^{120} *Super* + *Refine Extra* or *Puma Advance* + *Refine SG*

DO NOT apply *Stratego 250EC* fungicide mixed with *Puma*^{120} *Super* or *Puma Advance Herbicide* 2 to 3 days prior to or following cold temperatures (3°C or lower) as crop injury may occur.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT exceed 2 applications of this product per season.

Grazing: DO NOT graze or harvest as forage if 2 applications made in one season. If a single application is made, DO NOT allow livestock to graze or harvest as forage within 30 days after application.

Preharvest interval: cereals: 45 days, soybean: 20 days

Re-entry Interval: 12 hours.

Re-cropping: DO NOT plant back within 30 days for last application for crops not listed on label.

Storage: Store in cool dry place away from food, drink and animal feeding stuff. Keep leftover product in original container and tightly closed. Protect from freezing.

Environment: Toxic to fish and other aquatic organisms. DO NOT apply directly to any body of water and avoid drifting onto any body of water or other non-target areas. DO NOT contaminate water by cleaning of equipment or disposal of wastes. Specified buffer zones should be observed.

Hazard Rating:

(!) Danger – Eye irritant, potential skin sensitizer.

For an explanation of the symbols used here see page 11.

Tanos 50 DF

Fungicide Group – 11, 27

(Refer to page 311)

Company:

E.I. duPont Canada Company – PCP#27435

Formulation:

Dry flowable, 25% famoxadone and 25% cymoxanil. Container size - 2.5 to 5 kg.

Crops, Diseases and Timing:

Potato and Field Tomato - Early blight (*Alternaria solani*) and late blight (*Phytophthora infestans*). Make the first application following one or two applications of a preventative broad spectrum fungicide such as chlorothalonil or mancozeb. *Tanos 50 DF* may be applied on a 7 day interval, but it is recommended to alternate with a fungicide having a different mode of action to prevent resistance. Do not apply *Tanos 50 DF* to more than 500 acres per day.

Rates:

Apply at 225 to 340 g per acre.

Application Information:

Water volume: Use sufficient water to obtain thorough coverage. With a conventional sprayer use no less than 100 to 120 L per acre. With an air-assisted sprayer use no less than 44 L per acre. Ground application only.

How it Works:

The active ingredient cymoxanil is a cyanoacetamide-oxime fungicide with locally systemic activity. The active ingredient famoxadone is a strobilurin fungicide with broad spectrum activity. To be used as a preventative, curative and inhibitive (against sporulation) fungicide application. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None registered. Tank mix solutions containing boron may affect product solubility. When using boron containing solutions, add the correct amount of *Tanos 50 DF* first and boron containing solution last.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT exceed 6 applications of this product per season.

Grazing: No restrictions listed.

Preharvest interval: Potato 14 days and field tomato 7 days.

Re-entry: DO NOT re-enter treated areas within 24 hours of application.

Re-cropping: Crops that are on the product label (potato and field tomato) may be planted back at any time. A 30-day plantback interval is required for cereal grains. All other crops may be planted following a 1 year interval.

Storage: Store product closed in original container only. Protect against humid air and water. Avoid contact with food, drink and livestock feed material.

Environment: Toxic to fish and aquatic organisms. Observe prescribed buffer zones. Toxic to birds, mammals and harmful to beneficial arthropods. Minimize off-target drift to reduce the effects on wildlife at the field boundary. DO NOT apply to areas prone to run-off.

Hazard Rating:

☠ Warning Poison – Eye Irritant.

For an explanation of the symbols used here see page 11.

Tattoo C

Fungicide Group – 28, M5

(Refer to page 311)

Company:

Bayer CropScience – PCP#24544

Formulation:

375 g per L propamocarb HCl and 375 g per L chlorothalonil formulated as a suspension. Container size - 10 L.

Crops, Diseases and Timing:

Control of late blight (*Phytophthora infestans*) on potato. Begin applications when conditions are favorable for disease, but before infection, and continue on 7 to 14 day intervals until threat of disease is over. Use the 7 day interval when the risk and conditions for disease are high. To avoid resistance, rotating and alternating applications with fungicides having different modes of action is recommended if multiple fungicide applications are required.

Rates:

1.09 L per acre.

Application Information:

Water Volume (ground only): 80 to 120 L per acre.

How it Works:

The active ingredient propamocarb HCl is a carbamate fungicide with systemic activity. Chlorothalonil is a chloronitrile fungicide with contact activity. To be used as a preventative fungicide application. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None registered.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT exceed 3 applications of this product per season.

Grazing: DO NOT feed treated crops to livestock.

Preharvest interval: 7 days.

Re-entry: DO NOT re-enter treated areas within 48 hours after treatment. If required, individuals may re-enter treated areas within 48 hours for short tasks not involving hand labour, provided that 4 hours have passed since application and that long pants and a long-sleeve shirt are worn.

Re-cropping: DO NOT plant a new crop in the treated area within 120 days of the last application.

Storage: Keep away from fire, open flame or other sources of heat. DO NOT store below freezing. Store the tightly closed container away from seeds, fertilizers, plants and food-stuffs.

Environment: DO NOT apply directly to water or areas where surface water is present. DO NOT apply where runoff is likely to occur. DO NOT contaminate water when disposing of equipment wash waters. Allow a buffer zone of 15 m around bodies of water when applying.

Hazard Rating:

(!) Danger – Corrosive to eyes.

Potential skin sensitizer.

For an explanation of the symbols used here see page 11.

Tebuconazole

Folicur 432F/Folicur 250EW/Palliser/Fuse

Fungicide Group – 3
(Refer to page 311)

Company:

Bayer CropScience (*Folicur 432F* – PCP#25940, *Folicur 250EW* – PCP#29820)

Viterra (*Palliser* – PCP#30491)

Syngenta Canada (*Fuse* – PCP#30492)

Formulation:

Folicur 432F/Palliser/Fuse – 432 g per L tebuconazole formulated as a flowable liquid. Container size – 4.73 L.

Folicur 250EW – 250 g per L tebuconazole formulated as an emulsion in water. Container size – 8.1 L.

Crop, Diseases, Rates and Timing:

Crop:	Diseases:	Application Rate (per acre):		Timing:
		Folicur 432F/ Palliser/Fuse**	*Folicur 250EW*	
Wheat (includes spring, winter and durum)	Fusarium head blight (scab) – suppression only (*Fusarium* spp.) Control of septoria glume blotch (*Stagonospora nodorum*)	118 mL	202 mL	**Timing of application is critical:** Apply within the time period from when at least 75% of the wheat heads on the main stem are fully emerged to when 50% of the heads on the main stem are in flower. **Spray coverage is essential for optimum efficacy:** Spray equipment must be set to provide good coverage to heads (e.g. forward and backward mounted nozzles, or nozzles that have a two-directional spray).
	Control of tan spot (*Pyrenophora tritici- repentis*), septoria leaf blotch (*Septoria tritici*), leaf rust (*Puccinia triticina*) stem rust (*Puccinia graminis*) stripe rust (*Puccinia striiformis*)	89 to 118 mL	152 to 202 mL	Apply at the first sign or very early stage of disease, up to the end of the flowering stage. Use the higher rate when weather conditions are conducive for disease.
	Powdery mildew (*Erysiphe graminis*)	118 mL	202 mL	
Barley	Control of net blotch (*Pyrenophora teres*), spot blotch (*Cochliobolus sativus*),scald (*Rhynchosporium secalis*), leaf rust (*Puccinia hordei*), stem rust (*Puccinia graminis*), stripe rust (*Puccinia striiformis*), septoria leaf blotch (*Septoria passerinii*), powdery mildew (*Erysiphe graminis*)	89 to 118 mL	152 to 202 mL	
Oat	Control of crown rust (*Puccinia coronata*), stem rust (*Puccinia graminis*)	89 mL	152 mL	

* *Folicur 432F*, *Palliser* and *Fuse* are recommended to be used with a registered non-ionic surfactant, such as Agral 90 or *AgSurf*, at 1.25 L per 1000 L of spray solution.

Continued

Crop, Diseases, Rates and Timing *continued*:

Crop:	Diseases:	Application Rate (per acre):		Timing:
		*Folicur 432F**	*Folicur 250EW*	
Soybean	Control of Asian soybean rust (*Phakopsora pachyrhizi*), frogeye leaf spot (*Cercospora sojuna*), powdery mildew (*Microsphaera diffusa*) **	89 to 118 mL	152 to 202 mL	Apply when first symptoms of disease can be found or risk of infection is imminent. Use the higher rate when disease pressure is severe.

* Folicur 432F is to be used with a registered non-ionic surfactact, such as Agral 90 or AgSurf, at 1.25 L per 1000 L of spray solution.

** Folicur 432F is not registered for control of powdery mildew in soybeans.

Application Information:

Water Volume:

Ground: Minimum 40 L per acre. Ensure thorough coverage of all wheat heads. Avoid excessive water volumes (maximum 80 L per acre) at flowering time because this can increase the risk of infection.

Aerial: Minimum 19 L per acre.

How it Works:

The active ingredient tebuconazole is a triazole demethylation inhibitor (DMI) fungicide with systemic broad-spectrum activity. For more information refer to "FungicideModes of Action" on page 296.

Tank Mixes:

Herbicides: In spring wheat and barley, *Folicur 432F Palliser* or *Fuse* may be tank-mixed with *Puma*^{120} *Super* or *Refine Extra* for leaf diseases and respective weeds controlled (consult labels). In spring wheat only, *Folicur 432F Palliser* or *Fuse* may be tank-mixed with *Buctril M* or *Puma*^{120} *Super + Buctril M* for leaf diseases and respective weeds controlled (consult labels).

Fertilizers: None registered.

Insecticides: For control of orange wheat blossom midge (*Sitodiplosis mosellana*) in wheat, *Folicur 432F, Palliser* or *Fuse* may be tank mixed with *Lorsban 4E* labeled rates. See respective labels for directions and use precautions. **Fungicides:** None registered.

Bayer CropScience also supports the following mixes that are not on the *Folicur EW* label. Apply mixes according to the most restrictive use limitations for either product:

Insecticides: *Decis, Lorsban, Sevin XLR*

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT exceed one application of this product per season.

Grazing: DO NOT allow livestock to graze or feed green forage to livestock prior to 6 days after treatment. Straw cut after harvest may be fed or used for bedding.

Preharvest inteval: 36 days.

Re-entry: DO NOT re-enter treated areas within 12 hours of application.

Re-cropping: Treated areas may be replanted immediately following harvest with any crop listed on the *Folicur 432F/ Folicur 250EW* labels. For crops not listed on these labels, DO NOT replant treated areas for 120 days after last application.

Storage: Store in a cool, dry place and prevent cross contamination with other pesticides, fertilizers, food and feed.

Environment: Any products containing tebuconazole should not be used in areas treated with this product during the previous season (use only in alternate years). This product is toxic to birds, small wild animals, aquatic organisms, and non-target plants.

DO NOT apply directly to water, or to areas where surface water is present. Maintain a buffer zone of 30 m near aquatic areas. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Hazard Rating:

(!) Danger – Skin irritant.

⚠ Caution – Eye irritant.

For an explanation of the symbols used here see page 11.

Twinline

Fungicide Group – 3, 11
(Refer to page 311)

Company:

BASF Canada – PCP#30337

Formulation:

130 g per L pyraclostrobin and 80 g per L metconazole formulated as a liquid.

Container size – Case (2 x 8.1L) or 64 L drum.

Crops, Diseases, Rates and Timing:

Crop:	Diseases Controlled:	Application Rate (per acre):	Application Timing:
Wheat (all types) Triticale	Tan spot (*Pyrenophora tritici-repentis*), septoria leaf spot (*Septoria tritici* or *Stagonospora nodorum*), leaf rust (*Puccinia recondita*), spot blotch (*Cochliobolus sativus*), stripe rust (*Puccinia striiformis*), powdery mildew (*Erysiphe graminis* f. sp. *tritici*)	154 to 202 mL	Prior to disease development or at onset of disease. Optimal application timing is at the flag leaf stage. Use the 202 mL per acre rate to obtain extended protection with maximum yield benefits.
Barley	Net blotch (*Pyrenophora teres*), spot blotch (*Cochliobolus sativus*), scald (*Rhynchosporium secalis*), stripe rust (*Puccinia striiformis*)		
Oats	Crown rust (*Puccinia coronata*)		
Rye	Leaf rust (*Puccinia recondita*), powdery mildew (*Erysiphe graminis*)		

Application Information:

Water Volume:
Ground: Minimum of 40 L per acre.

Aerial: Minimum of 20 L per acre.

How it Works:

The active ingredient metconazole is a broad spectrum triazole demethylation inhibitor (DMI) fungicide with systemic activity. The active ingredient pyraclostrobin is a strobilurin fungicide with broad spectrum contact and systemic activity. Best utilized as a preventative application when environmental conditions are favourable for disease development. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT exceed 2 applications of this product per season.

Grazing: No restrictions listed.

Preharvest inteval: Apply no later than the end of flowering.

Re-entry: DO NOT re-enter treated areas within 6 days of application.

Re-cropping: A plant back interval of 35 days is required for all crops not listed on the label.

Storage: Store in original tightly closed container. Protect from freezing.

Environment: Avoid run-off from treated areas into aquatic areas. Toxic to aquatic organisms, non-target terrestrial plants and small wild animals. For ground application, buffer zones must be 1 m for protection of terrestrial habitats and aquatic habitats greater than 1 m deep and buffer zones must be 5 m from aquatic habitats less than 1 m deep. For aerial application, buffer zones must be 10 m for protection of terrestrial habitats and aquatic habitats greater than 1 m deep and buffer zones must be 250 m from aquatic habitats less than 1 m deep.

Hazard Rating:

☠ Danger – Poison

Eye and skin irritant.

For an explanation of the symbols used here see page 11.

Vertisan

Fungicide Group – 7

(Refer to page 311)

Company:

E.I. duPont – PCP #30332

Formulation:

200 g/L penthiopyrad formulated as an emulsifiable concentrate.

Crops, Diseases, Rates and Timing:

Crop:	Disease	Application Rate (per acre):	Application Timing:
Canola	Control of sclerotinia stem rot / white mould (*Sclerotinina sclerotiorum*)	500 to 600 ml	Apply at 20 to 50% bloom stage prior to disease development. Under high disease pressure, make a second application 7 to 14 days later. Use higher rate and shorter interval when disease pressure is high.
Dry legumes (chickpea, lentil, field, navy, pinto bean, field pea):	Control of ascochyta blight (*Ascochyta* spp.)	400 to 600 ml	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high.
	Control of gray mould (*Botrytis cinerea*)	500 to 600 ml	
	Suppression of Asian soybean rust (*Phakospora pachyrhizi*)	400 to 700 ml	
Cereals	Suppression of septoria leaf spot (*Septoria tritici*) in wheat, barley and triticale. Control of black stem rust (*Puccinia graminis* f.sp. *tritici*) in wheat, oats, triticale, barley. Control of brown leaf rust, orange leaf rust (*Puccinia recondite* f. sp. *tritici*) in wheat, rye, triticale.	500 to 700 ml	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high. For optimizing yield and flag leaf disease control apply at Feeke's 9, "flag leaf out". Do not apply after flowering (Feekes 10.5.1)
Corn	Suppression of grey leaf spot (*Cercospora zeae-maydis*) and control of common rust (*Puccinia sorghi*)	400 to 700 ml	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high. For suppression of grey leaf spot, add a non-ionic surfactant.
Soybean	Suppression of Asian soybean rust (*Phakospora pachyrhizi*), brown spot (*Septoria glycines*), frogeye leafspot (*Cercospora sojina*)	400 to 700 ml	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high.

Continued

Crops, Diseases, Rates and Timing *continued*:

Crop:	Disease	Application Rate (per acre):	Application Timing:
Sunflower	Suppression of rust (*Puccinina helianthi*) and sclerotinia head rot (*Sclerotinina sclerotiorum*)	700 ml	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high.
Potato	Suppression of early blight (*Alternaria solani*)	400 to 700 ml	Begin applications prior to disease development and continue on a 7 to 14 day interval. Use higher rate and shorter interval when disease pressure is high.
	Control of gray mould (*Botyrtris cinerea*).	500 to 600 ml	
	Suppression of stem rot (*Rhizoctonia solani*).	15.5 to 31 ml per 100 m row	In furrow at planting, using 1.4 to 1.75 L water per 100 row meters. Do not exceed 0.7 L per acre.
Sugar beets	Suppression of powdery mildew (*Erysiphe betae*)	400 to 600 mL	Begin applications prior to disease development and continue on a 7 to 14-day interval. Use higher rate and shorter interval when disease pressure is high.
	Crown and root rots (*Rhizoctonia solani*)	15.5 to 31 mL per 100 m row	Apply in furrow at planting, using 1.4 to 1.75 L water per 100 row meters. Do not exceed 890 mL per acre per application. Use higher rate when disease pressure is high..

Application Information:

Water Volume:

Ground: 45 L per acre.

Aerial: 16 L per acre. Use sufficient water to obtain thorough coverage of plants. DO NOT apply under periods of dead calm. Avoid application of this product when winds are gusty.

How it Works:

The active ingredient penthiopyrad is a carboxamide fungicide with broad spectrum, locally systemic and curative properties recommended for foliar and soil borne plant diseases.

Tank Mixes:

None registered.

Restrictions:

Resistance management: Refer to page 309. Make no more than 2 sequential applications before switching to a fungicide with a different mode of action.

Maximum seasonal use rate: Canola, dry legumes, soybean – 1.2 L per acre, cereal grains, corn – 1.4 L per acre, sunflower and sugar beet – 1.8 L per acre, potato – 2 L per acre.

Grazing: Sugarbeet tops may be used for grazing or forage 7 days after the last application.

Pre-harvest interval: DO NOT apply within the following number of days prior to harvest- canola, dry legumes (21), soybean, sunflower (14), corn, potato and sugar beet (7), cereal grains – no restriction

Re-Entry: DO NOT re-enter treated areas until 12 hours after application. For corn detasselling do not enter treated areas for 3 days.

Re-cropping: Crops and crop groups on the *Vertisan* label as well as the following crops may be planted immediately after harvest: alfalfa, low growing berries crop subgroup (strawberries), *Brassica* (cole) leafy vegetables crop group, bulb vegetable crop group (onion), cucurbit vegetables crop group (cucumber, melons, squash), fruiting vegetables crop group (tomato, pepper), leafy vegetables crop group (lettuce, celery, spinach), legume vegetables crop group (succulent), root vegetables crop subgroup (carrot, radish, turnip). All other crops cannot be planted until 12 months after last application.

Storage: Store product in original container only, away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Keep container closed.

Environment: This product is toxic to aquatic organisms. When using *Vertisan* consult the product label for buffer zones.

Hazard Rating:

(!) Danger – Eye irritant and skin irritant

Potential skin sensitizer.

For an explanation of the symbols used here see page 11.

Zampro

Fungicide Group – 40, 45
(Refer to page 311)

Company:

BASF Canada – PCP#30321
Distributed by Engage Agro Corporation

Formulation:

225 g per L dimethomorph and 300 g per L ametoctradin formulated as a suspension.

Container size – 4 x 4.14 L

Crops, Diseases, Rates and Timing:

Crop:	Diseases Controlled:	Application Rate (L per acre):	Application Timing:
Potato	Late blight (*Phytophthora infestans*)	0.32 to 0.4	Begin applications prior to disease development and continue on a 5 to 10 day interval. Use the higher rate and shorter interval when disease pressure is high. The addition of a spreading/penetrating adjuvant is recommended to improve disease control performance.
	Tuber blight (*Phytophthora infestans*)	0.4	When used in accordance to label recommendations, *Zampro* also reduces tuber blight when applied immediately prior to or after vine kill.

Application Information:

Water Volume:
Ground: Minimum of 80 L per acre.

Aerial: Minimum of 20 L per acre.

How it Works:

The active ingredient dimethomorph is a Carboxylic Acid Amide (CAA) fungicide with contact, systemic and antisporulant activity. The active ingredient ametoctradin is a Quinone x inhibitor (QxL) fungicide with contact and antisporulant activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None registered.

Restrictions:

Resistance management: Refer to page 309.

Maximum number of applications: DO NOT exceed 3 applications of this product per season

Grazing: No restrictions listed.

Preharvest Interval: 4 days.

Re-entry: Re-entry interval after application is 12 hours.

Re-cropping: A plant back interval of 30 days is required for all crops not listed on the label

Storage: Store in original tightly closed container. Protect from freezing.

Environmental Hazards: Avoid run-off from treated areas into aquatic areas. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Toxicity: Toxic to aquatic organisms.

Hazard Rating:

◈ Warning Poison – Eye Irritant.

For an explanation of the symbols used here see page 11.

Seed Treatment Tables

Table 7. Seed Treatment Products for Cereal Crops:

		CROPS						DISEASES										INSECTS		
PRODUCTS	**Page**	Wheat	Barley	Oat	Rye	Corn	Triticale	Seed and Seedling Rots / Blights	Pythium Seed Rot and Damping off	Common root rot / Crown Rot **	Loose smut (wheat, barley, oat)	Common bunt (wheat)	Covered smut (barley, oat)	False Loose smut (barley)	Seed-borne Septoria (wheat, barley, rye)	Early season leaf diseases	Seed and Soil-Borne *Rhizoctonia* spp. (barley, wheat, oats, corn)	Wireworms	Seed Corn Maggot	Corn flea beetle
Agrox B-2/Agrox CD	385					X		•											•	
Agrox FL	386					X		•												
Allegiance FL	414	X*	X*	X*	X*	X*	X*		•											
Armour/Armour RTU	430	X	X	X				①		•	•	•	•	•						
Belmont 2.7 FS	414	X*	X*	X*	X*	X*	X*		•											
Charter RTU	430	X	X	X				①		•	•	•	•	•						
Cruiser 5FS†	391	X	X		X	X	X											•	•	
Cruiser Maxx Cereals/ Cruiser Maxx Cereals Commercial†	394	X	X	X	X		X	①	•	•	④	•	•	•				•		
Cruiser Maxx Vibrance Cereals	394	X	X	X	X		X	①	•	•	•	•	•	•	•	⑨	•	•		
DB-Red L	398	X	X	X	X			①		•		③	•	•						
Dividend XL RTA	400	X	X	X	X	X	X	①	•	•	④	③	•	•	•	⑨⑩				
Gemini	404	X	X	X				①	②	②	•	•	•	•						
Maxim Quattro†	412					X		•	•								•			
Poncho 600FS†	418					X												⑤	⑤	
Proseed†	417	X	X	X	X	X	X	①									•			
Rancona Apex	420	X	X	X	X		X	①		•	•	•	•	•						
Raxil MD	422	X	X	X				①	•	•	•	•	•	•						
Raxil T	423	X	X	X				①	•	•	•	•	•	•	⑦					
Raxil WW	425	X	X	X				①	•	•	•	•	•	•				•**		
Sombrero	407					X												•		•
Thiram 75WP	428					X		①	•											
Vibrance XL	433	X	X	X	X		X	①	•	•	•	•	•	•	•	⑨	•			
Vitaflo 280/Vitaflo 220/ Vitaflo SP/Vitaflo	435	X	X	X	X	X	X***	①	•	•	•	•	•	•	⑦	⑥				

* For export markets only.

** Suppression only.

*** Vitaflo 280 only.

† Available to commercial seed treaters only.

① Includes seed rots and blights caused by *Fusarium* species.

② Except oats.

③ Includes rye.

④ Except barley.

⑤ Includes black cutworms, corn flea beetle, and white grubs.

⑥ Barley leaf stripe control and net blotch suppression.

⑦ Wheat only

⑨ Septoria leaf blotch on winter wheat.

⑩ Penicillium 3-leaf dieback on corn.

Table 8. Seed Treatment Products for Oilseed Crops:

		CROPS					DISEASES					INSECTS
PRODUCTS	Page	Canola	Mustard	Flax	Sunflower	Safflower	Seed and Seedling Rots / Blights	*Pythium* Seed Rot and Damping Off	Seed-borne Blackleg (canola)	Seed-borne *Alternaria*	Downy mildew (sunflower)	Flea Beetles
Allegiance FL	414	X			X			•			•	
Acceleron Seed Treatment Package	384	X					•*					•
Belmont 2.7 FS	414	X			X			•			•	
Gaucho CS FL†	402	X	X				•	•	•	•		•
Helix Vibrance	406	X	X				•	•	•	•		•
Helix XTra†	406	X	X				•	•	•	•		•
Prosper EverGo†/FX†	418	X	X				•	•	•	•		•
Poncho 600†	418	X										•
Rancona RS	421	X					•		•			
Sombrero	407	X	X**									•
Thiram 75WP	428		X			X	•	•				
Vitaflo 280 / Vitaflo 220 / Vitaflo SP / Vitaflo	435			X			•					

† Available to commercial seed treaters only.

* Partial Suppression

** Condiment-type only

Table 9. Seed Treatment Products for Pulse Crops:

PRODUCTS	Page	CROPS								DISEASES								INSECTS						
		Beans	Chickpea	Fababean	Lentil	Lupin	Pea	Soybean	Damping-off caused by *Rhizoctonia solani*	Seed and Seedling Rots / Blights**	Pythium Seed Rot and Damping Off	Seed-borne ascochyta (chickpea, lentil, pea)	Seed-borne anthracnose (beans)	Seed-borne bacterial brown spot (beans)	Seed-borne common blight (beans)	Seed-borne halo blight (beans)	Seed-borne Phomopsis (soybean)	European Chafer	Pea leaf weevil (pea only)	Potato leafhopper (dry beans only)	Root maggots	Seed corn maggot	Soybean aphid	Wireworms
Agrox B-2 / Agrox CD	385	X	X				X	X		•											•	•		
Agrox FL	386	X	X		X		X	X		•														
Allegiance FL	414	X	X		X[1]		X	X			②													
Apron Advance / Apron Maxx RTA / Apron Maxx RFC	387	X	X	X	X	X	X			•	•	•	•				②							
Belmont 2.7 FS	414	X	X		X[1]		X	X			②													
Crown	390				X					•		③												
Cruiser 5FS†	391	X	X		X		X	X											•	•		•		•
Cruiser Maxx Beans†	392	X						X		•	•		•				②	•		•		•	•	•
Cruiser Maxx Pulses†	392		X		X		X			•	•	•							•					•
Cruiser Maxx Vibrance Beans†	392							X	•	•	•						②	•		•		•	•	•
DCT	399																							
Kocide 2000	409	X	X							•				•	•	•								
Thiram 75WP	428	X	X				X	X		•	•													
Trilex AL	429	X	X		X		X	X		•	•	•*					•							
Vitaflo 280 / Vitaflo 220 / Vitaflo SP / Vitaflo	435	X	X		X***		X***	X		•	•	④					•							

* Suppression only.

** See product page for list of specific pathogens controlled

*** Vitaflo 280 only.

† Available to commercial seed treaters only.

① Only for low-tannin lentils.

② Includes early season *Phytophthora* root rot

③ Except peas.

④ Except chickpeas and lentils.

Table 10. Seed Treatment Products for Forages (Grasses and Legumes) and Special Crops:

PRODUCTS	Page	CROPS					DISEASES		INSECTS	
		Legumes (alfalfa, bird's-foot trefoil, clover, vetch, and sainfoin)	Grasses	Buckwheat, millet, sorghum (S)	Sugar beet	Herbs and Spices	Seed and Seedling Rots / Blights	*Pythium* Seed Rot and Damping Off	Sugar beet root maggot	wireworms (suppression)
Allegiance FL	414	X	X	S				•		
Belmont 2.7 FS	414	X	X	S				•		
Cruiser 5FS	391			X	X				•	•
Cruiser Maxx Cereals Seed Treatment / Cruiser Maxx Cereals Commercial†	394			X			③	•		•
Dividend XL RTA	400			X			•	•		
Proseed†	417			X**			②			
Thiram 75WP	428	X*	X				•	•		

† Available to commercial seed treaters only
* For alfalfa only
** Buckwheat and sorghum
① Includes early season *Phytophthora* root rot.
② Includes *Fusarium* and *Rhizoctonia* spp.
③ Includes *Fusarium*.

Table 11. Seed Treatments for Potatoes (includes post-harvest storage products and disinfectants):

PRODUCTS	Page	DISEASES						INSECTS					POST-HARVEST				
		Blackleg	Black Scurf	Silver Scurf	Common Scab (seed-borne)	Fusarium Seed Piece Decay	Verticillium Wilt	Colorado Potato Beetle	Potato Flea Beetle	Potato Leafhopper	Aphids	Wireworms	Silver Scurf	Storage rots caused by *Fusarium, Phoma, Oospora and Rhizoctonia*	Bacterial Soft Rot	Bacterial Ring Rot	Late Blight And Pink Rot
Actara	483							•		•	•						
Confine	389												•**				•**
Cruiser Maxx D Potatoes	397		•	•				•		•	•			•			
General Storage Disinfectant	405															①	
Imidacloprid Products (Admire SPT, Alias 240 SC)	407							•	•	•	•						
Mancozeb Products (Potato ST 16, Solan MZ and Tuberseal)	410					•											
Maxim D, Maxim Liquid PSP Maxim PSP/Maxim MZ PSP	411		•	•		•											
Mertect SC	413												•	•			
Polyram 16D	416				•	•											
Senator PSPT	426	•		•		•	•										
StorOx	427												•	②	•		
Titan ST	418							•	•	•	•	•					

* Before using any pesticide on potatoes, consult the list of Agricultural Pesticides Approved for Use from Simplot Canada and McCain Foods (Canada).
** Suppression only
① Not for use on potatoes. Use for disinfecting potato storages and equipment.
② *Fusarium* only

Seed Treatment Product Pages

Acceleron DX-910

Fungicide Group – U
(Refer to page 311)

Acceleron DX-910 Biological Seed Treatment **is currently only available as a co-pack with *Helix Xtra* (see *Acceleron Seed Treatment Package* on page 384).**

Company:

Becker Underwood Canada (PCP #29961)

Distributed by Monsanto Canada Inc.

Formulation:

0.18% *Bacillus subtilis*, strain MBI 600 (not less than 2.2 x 1010 viable spores per mL)

Container size – 1L to 1050 L.

Crops, Diseases, and Rate:

For partial suppression of seedling diseases (seed rot, pre and post emergent damping-off, seedling blight and root rot) caused by *Rhizoctonia* spp. and *Fusarium* spp. in canola, apply 160 mL of *Acceleron DX-910* per 100 kg of seed.

Application Information:

Apply *Acceleron DX-910* through commercial seed treating equipment. If used alone, slowly add *Acceleron DX-910* to sufficient water for good seed coverage and continue mixing until uniform. If used in combination, add the required amount of the chemical seed treatment first, then slowly add *Acceleron DX-910* to the solution and continue mixing until uniform. Do not store mixed solutions for longer than 72 hours before applying to the seed.

How it Works:

Bacillus subtilis, strain MBI 600 is a seed applied biological fungicide for the partial control of registered diseases. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

For control of seedling diseases (seed rot, pre and post emergent damping-off, seedling blight and root rot) caused by *Rhizoctonia* spp. and *Fusarium* spp. in canola, apply 160 mL of *Acceleron DX-910* tank-mixed with *Helix*, *Helix XTra*, or *Prosper FL* at labeled rates per 100 kg of seed.

Restrictions:

Resistance management: Refer to page 309.

Labelling: No restrictions listed.

Grazing: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: Store away from food and feed to prevent contamination. Store in a dry area for up to 2 years. *Acceleron DX-910* treated canola seed can be stored without loss of germination or disease performance. However, due to seed quality and seed storage conditions no claims are made to guarantee the germination of carryover seed.

Environment: DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Hazard Rating:

Potential sensitizer.

For an explanation of the symbols used here see page 11.

Acceleron Seed Treatment Package

Fungicide Group – 3, 4, 12, and U
Insecticide Group – 4A
(Refer to page 311 and 441)

Acceleron Seed Treatment Package **is a co-pack of** ***Acceleron DX-910 Biological Seed Treatment*** **(*****Bacillus subtilis*****, page 383) and** ***Helix Xtra*** **(thiamethoxam insecticide, and difenoconazole, metalaxyl-M, and fludioxonil fungicides, page 406). Information listed is limited to crop, diseases, insects and rates. For other detailed information on the component products see the product pages listed above.**

Company:

Distributed by Monsanto Canada Inc.

Acceleron: Becker Underwood Canada (PCP #30438)

Helix XTra: Syngenta Canada (PCP #26638)

Formulation:

0.18% *Bacillus subtilis*, strain MBI 600 (not less than 2.2 x 1010 viable spores per mL)

Helix Xtra (PCP #26638): 20.7% thiamethoxam, 1.25% difenoconazole, 0.39% metalaxyl-M, 0.13% fludioxonil formulated as a liquid seed treatment.

Crops:

Canola

Diseases:

For partial suppression of seedling diseases (seed rot, pre and post emergent damping-off, seedling blight and root rot) caused by *Rhizoctonia* spp. and *Fusarium* spp.

Insects:

Early season control of flea beetles (28 to 35 days).

Rate:

Apply 160 mL of *Acceleron DX-910* tank-mixed with 1.5 L *Helix XTra* per 100 kg of seed.

Hazard Rating:

Potential sensitizer.

☠ Caution – Poison

For an explanation of the symbols used here see page 11.

Agrox B-2/Agrox CD

Fungicide Group – M4,
Insecticide Group – 1B
(Refer to page 311 and 441)

Company:

Norac Concepts Inc.
(*Agrox B-2* – PCP#26956; *Agrox CD* – PCP#26957)

Formulation:

Agrox B-2: 33.5% captan, 11% diazinon.

Agrox CD: 15% captan, 15% diazinon.

Products formulated as wettable powders.

Container sizes - *Agrox B-2* - 2.0 kg; *Agrox CD* – 0.2, 0.6, 1 kg.

Crops:

Corn, bean, soybean, pea

Diseases:

Agrox B-2: Control of seedling blights and seed rot.

Agrox CD: Supplemental control of seedling blight and seed rot.

Insects:

Agrox B-2: Control of seed and root maggots.

Agrox CD: Control of seed corn maggots.

Rate and Application Information:

Agrox B-2:

Dry application: Apply 320 g for peas, beans, soybeans and 340 g for corn per 100 kg of seed.

Slurry machines: adjust to apply 1240 mL (1260 mL for corn) of slurry per 100 kg of seed and use 250 g of seed treatment per L of water.

Mixing in bucket (25 kg of seed): 84 g seed treatment per 500 mL of water per 25 kg of seed.

Agrox CD: Apply the contents of one 200 g container to 100 kg (4 units) of seed at planting or near planting time (50 g per 25 kg of seed).

How it Works:

The active ingredient captan is a phthalimide fungicide with multi-site contact activity. For more information refer to "Fungicide Modes of Action" on page 310. The diazinon component is an organophosphate insecticide with contact and stomach activity. For more information refer to "Insecticide Groups Based on Modes of Action" on page 400.

Tank Mixes:

Use *Agrox CD* only on seed previously treated with captan or thiram products. DO NOT use on seed already treated with an insecticide (other than methoxychlor or malathion). DO NOT use *Agrox B-2* on seed already treated with an insecticide.

Restrictions:

Resistance management: Refer to page 309.

Labelling: Treated seed must be labelled as follows: "This seed has been treated with diazinon and captan. Poisonous to humans and animals. DO NOT use for food or feed purposes. DO NOT sell to oil mills."

Grazing: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: Store in a cool, dry place. Use seed within one month of treatment.

Environment: DO NOT contaminate food, feed, or any body of water.

Hazard Rating:

☠ Danger – Poison

⚠ Warning – contains the allergen soy.

For an explanation of the symbols used here see page 11.

Agrox FL

Fungicide Group – M4
(Refer to page 311)

Company:

Norac Concepts Inc. – PCP#12028

Formulation:

30% captan formulated as a flowable suspension seed treatment.

Container sizes - 20 L, 415 L, 1000 L returnable container.

Crops and Rates:

Crop:	*Agrox FL* (mL per 100 kg seed)
Beans (various)	280
Chickpea	280
Lentil	280
Peas (various)	280
Soybean	280
Corn (field)	120* to 200
Corn (sweet)	240* to 340

* Product is to be applied at this rate only by a professional applicator using equipment which will assure complete and uniform coverage.

Diseases Controlled:

Storage rot, seed decay, root rot, damping off, seedling blights.

Application Information:

For use prior to storage or as a seed treatment. Mix the recommended amount of *Agrox FL* with the amount of water required for the slurry treater equipment to be used. Seed treated by the slurry method should not be bagged or stacked until it has dried. A colourant must be added to this product to colour the treated seed.

How it Works:

The active ingredient captan is a phthalimide fungicide with multi-site protective activity. For more information refer to "Fungicide Modes of Action" on page 310.

Restrictions:

Resistance management: Refer to page 309.

Labelling: Treated seed must be labelled, "This seed has been treated with *Agrox FL*. Poisonous to man and animals. DO NOT use for food or feed. DO NOT sell to oil mills."

Grazing: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: DO NOT freeze. Product must be stored at ambient temperatures above 0°C and must not be stored with herbicides, feed, food or fertilizer.

Environment: DO NOT contaminate food, feed, or any body of water.

Hazard Rating:

☠ Caution – Poison

For an explanation of the symbols used here see page 11.

Allegiance FL (2013)

See Metalaxyl on page 414.

Apron Advance/ Apron Maxx RTA/ Apron Maxx RFC

Fungicide Group –
Apron Advance – 1, 4, 12
Apron Maxx RTA/RFC – 4, 12
(Refer to page 311)

Company:

Syngenta Canada (*Apron Advance* – PCP #30627, *Apron Maxx RTA* – PCP #27577, *Apron Maxx RFC* – PCP #28817)

Formulation:

Active ingredient:	Active Ingredient Formulation:		
	Apron Advance	*Apron Maxx RTA*	*Apron Maxx RFC*
Fludioxonil	25 g/L	0.73%	2.31%
Metalaxyl-M and S-isomer	20 g/L	1.10%	3.46%
Thiabendazole	150 g/L	–	–
Container sizes:	–	56.78L	56.78L

Crops and Diseases:

Crop:	Diseases Controlled by *Apron Advance:*	Diseases Controlled by *Apron Maxx RTA* and *Apron Maxx RFC:*
Chickpea	Seed rot, pre-emergence damping-off, and post-emergence damping-off caused by *Fusarium* spp., *Pythium* spp., and *Rhizoctonia* spp. Seedling blights caused by *Pythium* and *Fusarium* spp.; Seed-borne ascochyta blight (*Ascochyta rabiei*); seed rot and seedling blight caused by seed-borne Botrytis spp.	Seedling blights, damping-off, and seed rots caused by *Pythium, Fusarium,* and *Rhizoctonia* spp. Seed-borne ascochyta blight (*Ascochyta rabiei*); seed rot and seedling blight caused by seed-borne *Botrytis* spp.
Lentil	Seed rot, pre-emergence damping-off, and post-emergence damping-off caused by *Fusarium* spp., *Pythium* spp., and *Rhizoctonia* spp. Seedling root rot caused by *Fusarium* spp; seed-borne ascochyta blight (*Ascochyta lentis*); seed rot and seedling blight caused by seed-borne *Botrytis* spp.	Seedling blights, damping-off, and seed rots caused by *Pythium, Fusarium,* and *Rhizoctonia* spp. Seed-borne ascochyta blight (*Ascochyta lentis*); seed rot and seedling blight caused by seed-borne *Botrytis* spp.
Dry pea	Seed rot, pre-emergence damping-off, and post-emergence damping-off caused by *Fusarium* spp., *Pythium* spp., and *Rhizoctonia* spp. Seedling blights caused by *Pythium, Fusarium,* and *Rhizoctonia* spp.; seed-borne ascochyta and foot rot (*Ascochyta pinodes*)	Seedling blights, damping-off, and seed rots caused by *Pythium, Fusarium,* and *Rhizoctonia* spp. Seed-borne ascochyta and foot rot (*Ascochyta pinodes*)

Crop:	Diseases Controlled by *Apron Advance:*	Diseases Controlled by *Apron Maxx RTA* and *Apron Maxx RFC:*
Dry bean	Seed rot, pre-emergence damping-off, and post-emergence damping-off caused by *Fusarium* spp., *Pythium* spp., and *Rhizoctonia* spp. Seedling blight caused by *Pythium* spp. Seed-borne anthracnose (*Colletotrichum* spp).	Seedling blights, damping-off, and seed rots caused by *Pythium, Fusarium*, and *Rhizoctonia* spp. Seed-borne anthracnose (*Colletotrichum* spp).
Lupin	Seed rot, pre-emergence damping-off, and post-emergence damping-off caused by *Fusarium* spp., *Pythium* spp., and Rhizoctonia spp. Anthracnose caused by seed-borne *Colletotrichum* spp.	Seedling blights, damping-off, and seed rots caused by *Pythium, Fusarium*, and *Rhizoctonia* spp.
Fababean		
Soybean	-	Seedling blights, damping-off, and seed rots caused by *Pythium, Fusarium*, and Rhizoctonia spp. Seed rot and seedling blight caused by seed-borne Phomopsis spp and early season root rot caused by *Phytophthora* spp.

Rates:

Apron Advance: 100 mL per 100 kg of seed.

Apron Maxx RTA: 325 mL per 100 kg of seed.

Apron Maxx RFC: 100 mL per 100 kg of seed.

Application Information:

Apron Advance is a seed treatment formulation for use in commercial seed treatment plants, and for on-farm treatment using auger treating only; do not use in hopper box or seed drill. *Apron Maxx RTA* is a ready-to-apply seed treatment formulation for use in commercial seed treatment plants and for on-farm treatment using standard gravity flow or mist type seed treatment equipment. Also used in treat-on-the-go air seeders. *Apron Maxx RFC* is a seed treatment formulation for use in commercial seed treatment plants, and for on-farm treatment using standard gravity flow or mist type seed treatment equipment which accurately meters, mixes and applies a flowable seed treatment. Also used in treat-on-the-go air seeders.

These products contain a pigment which will colour the treated seed. However, users are responsible for ensuring that the treated seed, when dried and ready for bagging, storage or seeding has an unnatural colour. If the pigment contained in the formulation does not colour the seed adequately, additional colourant must be added to the mixture while treating the seed. Ensure uniform coverage of the seed, as uneven seed coverage may not give the desired level of disease control. Treatment of highly damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour. Allow the seed to dry before bagging, storing or seeding.

How it Works:

Fludioxonil is a phenylpyrrole fungicide with contact activity. Metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes, including *Pythium* damping-off. Thiabendazole is a benzimidazole fungicide with both contact and systemic activity. For more information refer to "Fungicide Modes of Action" on page 310.

Restrictions:

Resistance management: Refer to page 309. Experience has shown that strains of fungus resistant to metalaxyl-M may develop. Failure to control the disease will likely result in crop damage and/or yield losses. If disease appears in a treated field, consult the government extension specialist immediately.

Labelling: All seed treated with Apron Maxx RTA or Apron Maxx RFC must be labelled "This seed has been treated with fludioxonil and metalaxyl-M fungicides. DO NOT use for food, feed or oil purposes". All seed treated with Apron Advance must be labelled "This seed has been treated with thiabendazole, fludioxonil and metalaxyl-M and S-isomer fungicides. Do not use for food, feed or oil purposes".

Grazing: No restrictions listed.

Re-cropping: DO NOT plant any crop other than soybean, dry bean, chickpea, lentil or dry pea within 30 days to fields in which treated seed was planted.

Storage: Store away from feeds and feedstuffs. Store between 0 and 30°C. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up.

Environment: This product is toxic to fish and other aquatic organisms. Do not apply directly to aquatic habitats; do not contaminate water by cleaning of equipment or disposal of wastes. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up.

Compatibility with rhizobia-based inoculants: These products are compatible with rhizobia-based inoculants. Check with inoculant manufacturer for details and refer to product labels prior to use. Mixing with inoculants may increase drying time while treating. Recalibrate the seed drill before planting treated seed.

Hazard Rating:

None listed.

Confine

Fungicide Group – 33

(Refer to page 311)

Company:

Winfield Solutions – PCP#29100

Canadian Agent: The Agronomy Company of Canada

Western Canada Distributor: Univar

Formulation:

45.8% mono and di-potassium salts of phosphorous acid

Container sizes - 9.46 L - 946.35 L.

Crops and Diseases:

Post-harvest treatment of potatoes for the suppression of late blight (*Phytophthora infestans*), pink rot (*Phytophthora erythroseptica*), and silver scurf (*Helminthosporium solani*) storage infection.

Rate and Application Information:

Dilute *Confine* at a 1:4.3 ratio with water (377 ml *Confine* + 1623 ml water). Apply 2 L of solution as a spray to 1000 kg of potatoes prior to storage. Ensure complete and even coverage.

How it Works:

The active ingredient mono- and di-potassium salts of phosphorous acid is a phosphonate fungicide with systemic activity to suppress pathogen inoculum. To be used as a preventative fungicide application on harvested tubers. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None Listed.

Restrictions:

Resistance management: Refer to page 309.

Labelling: No restrictions listed.

Grazing: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: Store this product away from food or feed.

Environment: DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of waste. DO NOT apply by air.

Hazard Rating:

None listed.

Crown

Fungicide Group – 1, 7

(Refer to page 311)

Company:

Manufactured by Chemtura Canada Co. – PCP#23430

Formulation:

92 g per L carbathiin and 58 g per L thiabendazole, formulated as a liquid seed treatment. Container size - 10 L, 200 L, 1000 L.

Crops, Diseases and Rates:

Crop:	Diseases Controlled:	Application rates (mL per 100 kg seed):
Lentil	Seed-borne ascochyta caused by *Ascochyta lentis*; seed rots and post-emergence damping off caused by *Botrytis, Fusarium* and *Rhizoctonia*.	300 to 600 mL *
Chickpea	Seed-borne ascochyta caused by *Ascochyta rabiei*.	300 to 600 mL**

* Use the higher rate to control seed-borne ascochyta in lentil.

** The lower rate will provide sufficient control of ascochyta in chickpea in most cases. Use the higher rate for smaller seed size varieties.

Application Information:

Commercial Treaters and On-Farm Auger Treating: *Crown* is a ready to use formulation designed for commercial treaters and on-farm auger treating. *Crown* is added directly to the seed as it enters a mixing chamber or auger. It is important that the seed and chemical be mixed quickly and uniformly. See instructions supplied with the applicable treater system for information on proper application techniques. When a grain auger is used for treating, running the auger less than full is the key to adequate mixing. Augers used for handling treated seed should not be used to move seed for food, feed or oil processing.

Applications to Seed in a Hopper Box or Seed Drill: Partially fill the hopper box or seed drill with a pre-measured amount of seed. Apply the proper amount of *Crown* evenly over the seed surface. DO NOT pour in one area. Mix with a paddle until all seed is of a uniform red colour, indicating adequate coverage. DO NOT MIX WITH HANDS. Repeat this procedure until the hopper box or seed drill is filled. Seed can be planted immediately after treatment without drying. Stir *Crown*-treated seed rigorously if the seeding operation has been interrupted for several hours or overnight.

How it Works:

The active ingredient carbathiin is a carboximide fungicide with systemic activity and the active ingredient thiabendazole is a benzimidazole fungicide with both contact and systemic activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 309.

Labelling: Treated seed must be labelled "This seed has been treated with *Crown* seed protectant, which contains carbathiin and thiabendazole. DO NOT use for food, feed or oil processing."

Grazing: DO NOT graze or feed livestock on treated areas for 4 weeks after planting.

Re-cropping: No restrictions listed.

Storage: DO NOT store product above 35°C or below 0°C or in direct sunlight. Store in original container only, away from other pesticides, fertilizers, food or feed. Mix product prior to use by shaking the 10 L container.

Environment: Treated seed may be toxic to birds and other wildlife. Clean up any spilled seed. Ensure treated seed is properly incorporated at planting.

Compatibility with rhizobia-based inoculants: *Crown* is compatible with rhizobia and performs as a sticker for peat and granular inoculants. *Crown* and rhizobia can be applied simultaneously to seed through separate systems or applied sequentially. Read inoculant label before use.

Hazard Rating:

⚠ Caution – Eye Irritant

For an explanation of the symbols used here see page 10

Cruiser 5FS

Insecticide Group – 4
(Refer to page 400)

Contains insecticide only. Available to commercial seed treaters only.

Company:

Syngenta Canada – PCP#27045

Formulation:

Cruiser 5FS: 47.6% thiamethoxam.
Container size - 23.4L and 56.78 L.

Crops, Insects and Rates:

Crops:	Inescts Controlled:	Rate per 100 Kg of seed[1]
Wheat and Barley	Wireworms (suppression)[2]	17 mL
	Wireworms (control)[2]	33 to 50 mL
Corn	Seed corn maggot	83 to 166 mL
	Wireworms	83 mL
Soybean	Seed corn maggot	50 to 83 mL
	Wireworms, Soybean aphid	83 mL
Dry bean	Potato leafhopper[3]; Seed corn maggot	50 to 83 mL
	Wireworms (suppression)[2]	17 mL
	Wireworms (control)[2]	33 to 50 mL
Pea, chickpea and lentil	Pea Leaf Weevil (pea only)	50 to 83 mL
	Wireworms (suppression)[2]	17 ml
	Wireworms (control)[2]	33 to 50 mL
Sugar beet	Sugar beet root maggot and wireworms	50 to 100 mL per 100,000 seeds
Rye, millet, buckwheat, sorghum, and triticale	Wireworms (suppression)[2]	17 mL
	Wireworms (control)[2]	33 to 50 mL

[1] Use the higher rate for fields that have a history of moderate to severe insect pressure.

[2] Use lower rate for early season suppression of wireworms. However, if pressure is moderate to high or control is required, treat crops at higher control rate per 100 kg of seed.

[3] Use the higher rate to replace one application of a foliar insecticide spray.

Application Information:

For use only in commercial seed treatment facilities with closed transfer systems that provide uniform seed coverage. *Cruiser 5FS* contains no colourant. A red colourant must be added when *Cruiser 5FS* is applied to grain. Treatment of highly mechanically scarred or damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour. Allow the seed to dry before bagging or storing in bulk containers.

How it Works:

Thiamethoxam is a seed treatment insecticide in the neonicotinoid class of chemistry that controls listed chewing and sucking insects through contact and systemic activity. For more information refer to "Insecticide Groups Based on Modes of Action" on page 400.

Tank Mixes:

For control of seed and soil-borne diseases, *Cruiser 5FS* can be mixed with fungicide seed treatments in a closed transfer system. Refer to label for details.

Restrictions:

Resistance management: Refer to page 399.

Labelling: All seed must be labelled "Seed treated with thiamethoxam insecticide. DO NOT use for food, feed or oil processing."

Grazing: DO NOT graze or feed livestock on treated areas for 45 days after planting.

Re-cropping: No restrictions listed.

Storage: Store away from food and feed. Ideal storage temperature is above freezing and below 30°C. If product should freeze, bring to room temperature, then ensure the contents are mixed well prior to application.

Environment: Products are toxic to fish and aquatic invertebrates. DO NOT apply directly to water or to areas where surface water is present. DO NOT contaminate food, feed, domestic or irrigation water supplies, lakes, streams and ponds. If treated seed is spilled outdoors or accessible to birds, promptly clean up or bury to prevent ingestion.

Hazard Rating:

Caution – Poison

For an explanation of the symbols used here see page 11.

Cruiser Maxx Beans/ Cruiser Maxx Vibrance Beans/ Cruiser Maxx Pulses

Insecticide Group – 4
Fungicide Group – Cruiser Maxx Pulses/Cruiser Maxx Beans – 4, 12
Cruiser Maxx Vibrance Beans – 4, 7, 122
(Refer to page 311 and 441)

Available to commercial seed treaters only.

***Cruiser Maxx Beans* is a premix of *Cruiser 5FS* (page 391) and fludioxonil and metalaxyl-M (R- and S-isomers). *Cruiser Maxx Vibrance Beans* is a co-pack containing *Cruiser Maxx Beans* and *Vibrance 500FS* (page 431). *Cruiser Maxx Pulses* is a co-pack containing *Cruiser 5FS* (page 391) and *Apron Maxx RFC* (page 387). For more detailed information on the component products, consult individual pages in this guide as well as product labels.**

Company:

Syngenta Canada

Formulation:

Cruiser Maxx Beans (PCP#28821) 22.6% thiamethoxam, 1.70% metalaxyl-M (R-and S-isomers), and 1.12% fludioxonil formulated as a liquid suspension seed treatment.

Cruiser Maxx Pulses: Cruiser 5FS (PCP#27045) 47.6% thiamethoxam formulated as a suspension and *Apron Maxx RTA* (PCP #27577) 0.73% fludioxonil plus 1.10% metalaxyl-M and S-isomers as a liquid seed treatment or *Apron Maxx RFC* (PCP#28817) 2.31% fludioxonil plus 3.46% metalaxyl-M formulated as a liquid seed treatment.

Cruiser Maxx Vibrance Beans: Cruiser Maxx Beans (PCP#28821) 22.6% thiamethoxam, 1.70% metalaxyl-M (R-and S-isomers), and 1.12% fludioxonil formulated as a suspension and *Vibrance 500FS* (PCP #30438) 500 g/L sedaxane formulated as a suspension.

Container size - *Cruiser Maxx Beans* 56.78 L, *Cruiser Maxx Vibrance Beans* – see sizes for *Cruiser Maxx Beans* and *Vibrance 500FS*, *Cruiser Maxx Pulses* – see sizes for *Cruiser 5FS* and *Apron Maxx RTA*/*Apron Maxx RFC*.

Crops, Diseases and Insects:

Product	Crop:	Diseases Controlled:	Insects Controlled:
Cruiser Maxx Vibrance Beans	Soybean	Seed decay, seedling blight and damping-off caused by *Rhizoctonia solani* and diseases controlled by *Cruiser Maxx Beans.*	See insects controlled by *Cruiser Maxx Beans.*
Cruiser Maxx Beans	Soybean[1]	Seed rot/pre-emergence damping-off, and post-emergence damping-off caused by *Fusarium* spp., *Pythium* spp. and *Rhizoctonia* spp.; seedling blight caused by *Fusarium* spp., and *Pythium* spp.; seedling root rot caused by *Fusarium* spp.; seed rot and seedling blight caused by seed-borne *Phosmopsis* spp.; early season root rot caused by *Phytophthora megasperma* var. *sojae*[2]	Wireworm, seed corn maggot, European chafer, bean leaf beetle, and soybean aphid (early season protection)
	Dry Bean	Seed rot/pre-emergence damping-off, and post-emergence damping-off caused by *Fusarium* spp., *Pythium* spp. and *Rhizoctonia* spp.; seedling blight caused by *Pythium* spp.; anthracnose caused by seed-borne *Colletotrichum* spp.	Wireworm, seed corn maggot, and potato leafhopper[3]
Cruiser Maxx Pulses	Dry pea (including field pea)	Seed-borne ascochyta blight and foot rot caused by *Ascochyta pinodes*; seed rot, damping-off, and seedling blight caused by *Pythium* spp., *Rhizoctonia* spp., and *Fusarium* spp.	Pea leaf weevil and wireworm
	Lentil	Seed-borne ascochyta blight caused by *Ascochtya lentis*; damping-off and seed rot cause by *Pythium* spp., Rhizoctonia spp., and *Fusarium* spp.; seedling root rot caused by *Fusarium* spp.; seed rot and seedling blight caused by seed-borne *Botrytis* spp.	Wireworm
	Chickpea	Seed-borne ascochyta blight caused by *Ascochyta rabiei*; damping-off and seed rot caused by *Pythium* spp., *Rhizoctonia* spp., and *Fusarium* spp.; seedling blight caused by *Fusarium* spp., and *Pythium* spp.; seed rot and seedling blight caused by seed-borne *Botrytis* spp.	Wireworm

[1] Based on 6,600 soybean seeds per kg, *Cruiser Maxx Beans* delivers 85 μg of active ingredient (76 μg of thiamethoxam, 5.7 μg of metalaxyl-M and 3.8 μg of fludioxonil) per seed.

[2] *Cruiser Maxx Beans* provides early season protection against *Phytophthora* root rot for tolerant varieties of soybeans. If target fields have a history of high *Phytophthora* pressure, or susceptible varieties are to be treated, then tank-mix 195 mL of *Cruiser Maxx Beans* with 31 mL of *Apron XL LS* per 100 kg of seed.

[3] Replaces one application of a foliar insecticide spray.

Rate:

Cruiser Maxx Vibrance Beans: *Cruiser Maxx Beans* 195 mL + *Vibrance 500FS* at 5 to 10 mL per 100 kg of seed.

Cruiser Maxx Beans: 195 mL per 100 kg of seed.

Cruiser Maxx Pulses: *Apron Maxx RTA* 325 mL or *Apron Maxx RFC* 100 mL + *Cruiser 5FS* at 50 to 83 mL per 100 kg seed.

These should be tank mixed and applied by an approved commercial seed treating facility.

Application Information:

For use only in commercial seed treatment facilities with closed transfer including closed mixing, loading, calibrating, and closed treatment equipment. No open transfer of seed treatments. All seed treated with this product must be conspicuously coloured at the time of treatment. Treatment of highly mechanically scarred or damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour.

How it Works:

Thiamethoxam is a seed treatment insecticide in the neonicotinoid class of chemistry that controls listed chewing and sucking insects through contact and systemic activity. For more information refer to "Insecticide Groups Based on modes of Action" on page 296. Metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes, including Pythium damping-off. The active ingredient fludioxonil is a phenylpyrrole fungicide with contact activity. The active ingredient Sedaxane is a succinate dehydrogenase inhibitor fungicide with systemic activity that inhibits fungal metabolism by binding to the succinate dehydrogenase enzyme to disrupt cellular respiration and energy generation. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Peas: When used at the low rate, *Cruiser Maxx Beans* may be tank-mixed with *Apron Maxx RTA*. Follow respective labels for diseases controlled and other instructions before tank-mixing.

Restrictions:

Resistance management: Refer to page 309.

Labelling: All seed must be labelled "This seed has been treated with the insecticide, thiamethoxam and metalaxyl M (including R- and S-isomer) and fludioxonil fungicides [and sedaxane fungicide if *Cruiser Maxx Vibrance Beans*]. DO NOT use for food, feed or oil processing."

Grazing: DO NOT graze or feed livestock on treated areas for 45 days after planting.

Re-cropping: DO NOT plant any crop other than soybeans, dry beans, chickpeas, lentils and dry peas (including field peas) within 45 days in which treated seeds were planted.

Storage: Store away from food and feed. Ideal storage temperature is above freezing and below 30°C. Repeated freeze-thawing of Cruiser Maxx Beans will not affect the physical integrity of the product. If product should freeze, bring to room temperature, then ensure the contents are mixed well prior to application.

Environment: This product is toxic to fish and other aquatic organisms. DO NOT apply this product directly to aquatic habitats, estuaries or marine habitats. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. DO NOT contaminate food, feed, domestic or irrigation water supplies, lakes, streams and ponds. If treated seed is spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion.

Compatibility with rhizobia-based inoculants: *Cruiser Maxx Beans* is compatible with rhizobium-based inoculants. Please check with inoculant manufacturers for details prior to use. Mixing with inoculants may increase drying time while treating extends the processing time. Recalibrate equipment before planting treated seed.

Hazard Rating:

▽ Caution – Poison

▽ Caution – Skin Irritant

For an explanation of the symbols used here see page 11.

Cruiser Maxx Vibrance Cereals/Cruiser Maxx Cereals/Cruiser Maxx Cereals Commercial

Insecticide Group – 4
Fungicide Group –
Cruiser Maxx Cereals/Cruiser Maxx Cereals Commercial – 3, 4
Cruiser Maxx Vibrance Cereals – 3, 4, 7
(Refer to page 311 and 441)

Cruiser Maxx Cereals Seed Treatment **is a ready-to-use water-based formulation for on-farm seed treatment of small-grained cereals for disease and insect protection.**

Cruiser Maxx Cereals Commercial **is a ready-to-use water-based formulation for use in commercial seed treatment plants available to commercial seed treaters only.**

Cruiser Maxx Vibrance Cereals **OR** ***Cruiser Maxx Cereals Commercial*** **may be used with Cruiser 5FS/350FS seed treatment insecticide to achieve a high rate for control of wireworm under moderate to high insect pressure. This tank mix may be applied in COMMERCIAL SEED TREATMENT FACILITIES ONLY.**

Company:

Syngenta Canada (*Cruiser Maxx Vibrance Cereals Seed Treatment* – PCP#30436; *Cruiser Maxx Cereals Seed Treatment* – PCP#29192; *Cruiser Maxx Cereals Commercial* – PCP#29127)

Formulation:

Cruiser Maxx Cereals Seed Treatment and *Cruiser Maxx Cereals Commercial*: 2.80% thiamethoxam, 3.36% difenoconazole, 0.56% metalaxyl-M (and S-isomer) formulated as a liquid suspension seed treatment.

Cruiser Maxx Vibrance Cereals Seed Treatment 30.7 g/L thiamethoxam, 36.9 g/L difenoconazole, 9.5 g/L metalaxyl-M (and S-isomer) and 8.0 g/L sedaxane formulated as a liquid suspension seed treatment.

Container size - 2x10L, 115 L, 450 L.

Crops, Diseases and Insects (*Cruiser Maxx Cereals Seed Treatment, Cruiser Maxx Cereals Commercial, and Cruiser Maxx Vibrance Cereals*):

Crop:	Diseases Controlled:	Diseases Suppressed[5]	Insects:
Barley	General seed rots[3]; seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*; covered smut (*Ustilago hordei*); false loose smut (*U. nigra*)	Common root rot (caused by *Cochliobolus* spp.); *Fusarium* crown and foot rot; take-all (*Gaeumannomyces graminis var. tritici*)	Suppression or control of wireworm[1] (*Agriotes*, *Limonius*, and *Melanotus* spp.) and European chafer[2] (*Rhizotrogus majalis*)
Winter Wheat	General seed rots[3]; seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*; common bunt (*Tilletia tritici, T. laevis*); dwarf bunt (*T. controversa*); loose smut (*Ustilago tritici*)		
Spring Wheat	General seed rots[3]; seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*; common bunt[4] (*Tilletia tritici, T. laevis*) loose smut (*Ustilago tritici*)		
Rye	General seed rots[3]; seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*, common bunt (*Tilletia caries*); dwarf bunt[4] (*T. controversa*)		Suppression or control of wireworm[1] (*Agriotes*, *Limonius*, and *Melanotus* spp.)
Triticale	General seed rots[3]; seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*, loose smut (*Ustilago tritici*)		
Oats	General seed rots[3]; seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*, covered smut (*Ustilago kolleri*), loose smut (*U. avenae*)	Common root rot (Cochliobolus spp.)	Suppression of wireworm[5] (*Agriotes*, *Limonius*, and *Melanotus* spp.)

Additional Diseases (*Cruiser Maxx Vibrance Cereals ONLY*):

Crop:	Diseases Controlled:
Barley	Seedling blight, root rot, and damping-off caused by seed- and soil-borne *Rhizoctonia* spp. True loose smut (*Ustilago nuda*)
Winter Wheat	Seedling blight, root rot, and damping-off caused by seed- and soil-borne *Rhizoctonia* spp. Seed-borne *Septoria* (use 650 mL rate for control) *Septoria* leaf blotch (early season foliar disease control for first 4 weeks after planting; for full season control apply a foliar fungicide according to label directions)
Spring wheat	Seedling blight, root rot, and damping-off caused by seed- and soil-borne *Rhizoctonia* spp.
Oats	Seedling blight, root rot, and damping-off caused by seed- and soil-borne *Rhizoctonia* spp.

See footnotes on following page.

Additional Crops (*Cruiser Maxx Cereals Seed Treatment, Cruiser Maxx Cereals Commercial ONLY*):

Crop:	Diseases Controlled:	Insects:
Buckwheat	General seed rots[3]; seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*	Wireworm (suppression)[1] (*Agriotes, Limonius,* and *Melanotus* spp.)
Millet (Pearl, Proso)	General seed rots[3]; seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*	
Sorghum	General seed rots[3]; seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*	

[1] These products provide suppression of wireworm activity at the 325 ml/100 kg seed rate; however, if pressure is moderate to high or control is required, use the 650 mL/100 kg seed rate to achieve 20 g thiamethoxam per 100 kg seed. Commercial seed treaters may tank mix *Cruiser Maxx Cereals Commercial* OR *Cruiser Maxx Vibrance Cereals* with *Cruiser 5FS/350FS Seed Treatment* insecticide to achieve a total use rate of 20 to 30 g of thiamethoxam per 100 kg seed. Consult labels for use rates and instructions.

[2] For control of European chafer activity on wheat and barley, *Cruiser Maxx Cereals Commercial* OR *Cruiser Maxx Vibrance Cereals* may be mixed with *Cruiser 5FS/350FS Seed Treatment Insecticide* to achieve a total use rate of 30 g of thiamethoxam per 100 kg seed. Consult labels for use rates and instructions. This tank mix may be applied in commercial seed treatment facilities ONLY.

[3] General seed rots controlled include those caused by saprophytic organisms such as *Fusarium, Pythium, Penicillium* and *Aspergillus.*

[4] Controls both seed- and soil-borne bunts (common, dwarf).

[5] Suppression means consistent control at level which is not optimal but is still of commercial benefit.

[6] When seed is treated for post-planting protection against registered pests, these products will also provide protection during post-treatment storage of the seed against damage from many storage insect pests. Seed treated with thiamethoxam has been tested and found to be effective against rusty grain beetle, saw-toothed grain beetle, red flour beetle, rice weevil, lesser grain borer, European corn borer and Indian meal moth. It is recommended that seed with existing populations of storage pests be fumigated prior to treating and storage of that seed.

Rate:

325 mL or 650 mL per 100 kg of seed. Use the higher rate if: a) There is a history of high disease pressures in the field, or b) where conditions favour seed-borne and soil-borne pathogens, or c) when controlling seed-borne *Septoria* or early season *Septoria* leaf blotch, or d) if control of wireworm is required or if wireworm populations are expected to be moderate to high; or e) for *Cruiser Maxx Vibrance Cereals* only, where high levels of seed-borne infections like smuts are high.

Application Information:

All seed treated with this product must be conspicuously coloured at the time of treatment. Treatment of highly mechanically scarred or damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour.

Cruiser Maxx Cereals Commercial is for use only in commercial seed treatment facilities.

How it Works:

Thiamethoxam is a seed treatment insecticide in the neonicotinoid class of chemistry that controls listed chewing and sucking insects through contact and systemic activity. For more information refer to "Insecticide Groups Based on Modes of Action" on page 400. The active ingredient difenoconazole is a triazole fungicide with broad-spectrum, systemic activity. Metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes, including Pythium damping-off. The active ingredient Sedaxane is a succinate dehydrogenase inhibitor fungicide with systemic activity that inhibits fungal metabolism by binding to the succinate dehydrogenase enzyme to disrupt cellular respiration and energy generation. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Cruiser Maxx Cereals Commercial or *Cruiser Maxx Cereals Vibrance* may be mixed with 325 mL of *Dividend XL RTA* if a) there is a history of high disease pressures in the field,

b) where field conditions favour seed-borne and soil-borne pathogens, or c) when controlling seed-borne *Septoria*. Consult each product and follow the most restrictive label precautions and limitations.

Restrictions:

Resistance management: Refer to page 309.

Thiamethoxam is a Group 4 Insecticide. Do not make any subsequent application of a Group 4 Insecticide (i.e., in-furrow or foliar application) following treatment with these products.

Experience has shown that strains of fungus resistant to metalaxyl-M (and S-isomer) may develop. Failure to control the disease will result in crop damage and/or yield losses. If disease appears in a treated field, consult the government extension specialist immediately.

Labelling: All seed must be labelled "This seed has been treated with the insecticide, thiamethoxam and difenoconazole and metalaxyl M (and S-isomer) fungicides [and sedaxane fungicide if Cruiser Maxx Vibrance Cereals]. DO NOT use for food, feed or oil processing."

Grazing: DO NOT graze or feed livestock on treated areas for 45 days after planting.

Re-cropping: No restrictions listed.

Storage: Store away from food and feed. Ideal storage temperature is above freezing and below 30°C. Repeated freeze-thawing of product will not affect the physical integrity of the product. If product should freeze, bring to room temperature, and then ensure the contents are mixed well prior to application.

Environment: Toxic to aquatic organisms. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. DO NOT contaminate food, feed, domestic or irrigation water supplies, lakes, streams and ponds. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface.

Hazard Rating:

☠ Caution – Poison

◇ Warning – contains the allergen sulfites.

For an explanation of the symbols used here see page 11.

Cruiser Maxx D Potatoes

Insecticide Group – 4A
Fungicide Group – 12
(Refer to page 311 and 441)

***Cruiser Maxx D Potatoes* is a co-pack of *Maxim D Seed Treatment Fungicide* (fludioxonil and difenoconazole, page 411) and *Actara 240SC Insecticide* (thiamethoxam, page 483). Information listed is limited to crop, diseases, insects and rates. For other detailed information on the component products see the product pages listed above.**

Company:

Syngenta Canada

Formulation:

Cruiser Maxx Potatoes has two components:

***Maxim D* (PCP#30599):** 19.4 g/L fludioxonil and 19.4 g/L difenoconazole formulated as a suspension.

***Actara 240SC* (PCP#28407):** 240 g per L thiamethoxam formulated as soluble concentrate.

See the component products for other information. Use the most stringent restrictions for either product.

Crops, Diseases, and Insects:

Maxim D: Seed piece treatment fungicide for use on potato for the control of black scurf/stem and stolon canker (*Rhizoctonia solani*), silver scurf (*Helminthosporium solani*), and fusarium dry rot (*Fusarium* spp.).

Actara 240 SC: Seed piece treatment insecticide for use on potato for the control of Colorado potato beetle, aphids, potato leafhopper.

Rate and Application Information:

Maxim Liquid PSP: 130 mL per 100 kg of seed for control of black scurf/stem and stolon canker and silver scurf; 65-130 mL per 100 kg of see for control of fusarium dry rot (use the high rate when disease pressure and/or resistance pressure is high).

Actara 240 SC: Choose the appropriate rate from the chart on label, based on seeding rate.

Hazard Rating:

☠ Caution – Poison

For an explanation of the symbols used here see page 11.

DB-Red L

Fungicide Group – M3
(Refer to page 311)

Company:

Loveland Products Inc., distributed by United Agri Products – PCP#27144

Formulation:

323 g per L maneb formulated as a liquid. Container size - 9 L to 57 L.

Crops, Diseases and Rates:

Crop:	Diseases Controlled:	Rate per 100 Kg seed:
Wheat	Common bunt (*Tilletia tritici, T. laevis*), Root rot, and seedling blight (including *Fusarium*)	312 mL
Barley	Covered smut (*Ustilago hordei*), false loose smut (*U. nigra*), root rot, and seedling blight	396 mL
Oat	Covered smut (*Ustilago kolleri*), root rot, and seedling blight	552 mL
Rye	Common bunt (*Tilletia caries*), root rot, and seedling blight	260 mL

Application Information:

Designed as a ready-to-use seed treatment for on-the-farm and commercial use with a seed treater suitable for metering and mixing flowable seed treatments. Use only the recommended rate, lower amounts may not give the desired control. Higher amounts may cause seed injury. Uneven treating of seed may cause over treatment on some seed kernels and under treatment on other seed kernels. Seed should be well cured, dry and cleaned before treatment. For maximum benefits, avoid deep seeding and exceptionally early sowing under poor growing conditions. Treat only those seeds needed for immediate use, minimizing the interval between treatment and planting. Do not store excess treated seeds beyond planting time. Treated seed must not be used for or mixed with food or animal feed, or processed for oil. Dispose of all excess treated seeds by seeding away from bodies of water.

How it Works:

The ingredient maneb is a dithiocarbamate fungicide with multi-site contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 309.

Labelling: If treated seed is stored, label container "This seed has been treated with *DB-Red L* seed treatment. DO NOT use for food, feed or processing."

Grazing: DO NOT graze or feed livestock on treated areas.

Re-cropping: No restrictions listed.

Storage: Store away from heat source and in a cool, dry area. If product becomes frozen, thaw and shake or agitate. Excess treated seed should not be stored past planting time. DO NOT contaminate feed or food stuffs.

Environment: This product is toxic to fish, birds and other wildlife. DO NOT contaminate ponds, lakes or streams.

Hazard Rating:

☠ Danger – Poison

For an explanation of the symbols used here see page 11.

DCT

Fungicide Group – 1,M4
Insecticide Group – 1B
(Refer to page 311 and 441)

Company:

Norac Concepts Inc. – PCP#14986

Formulation:

6% diazinon, 18% captan, and 14% thiophanate-methyl formulated as a water soluble powder.

Container size - 0.4 kg, 10 kg.

Crops and Diseases:

Field bean: Control of seedling blight, root rot, seed-borne anthracnose.

This product will not control anthracnose if seed is severely infected.

Sweet corn: Control of seed borne *Penicillium oxalicum* and *Penicillium* spp.

Insects:

Control of root maggots on beans and sweet corn.

Rates:

For slurry machines: 520 g per 1 L water. Use 1 L of slurry per 100 kg of seed.

For mixing in bucket: 130 g per 0.35 L water. Use 0.35 L of slurry per 25 kg of seed. Mix well to keep powder suspended in water. Dry the seed before seeding or bagging.

For Sweet corn: 125 g of product per 25 kg of seed.

Application Information:

May be applied as a water-based slurry through standard slurry or commercial seed treating equipment. For best results, seed should be planted within a week after treating. This product will not control anthracnose if seed is severely infected. Treatment of mechanically scarred or damaged seed, or of seed known to be of low germ, low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour. Treat and conduct germination tests on a small portion of seed before committing the total seed lot to a selected seed treatment.

How it Works:

The active ingredient captan is a phthalimide fungicide with multi-site protective activity. The active ingredient thiophanate-methyl is a methyl-benzimidazole carbamate fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 310. The diazinon component is an organophosphate insecticide with contact and stomach activity. For more information refer to "Insecticide Groups Based on Modes of Action" on page 400.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 309.

Labelling: Treated seed should be coloured and labelled "Poisonous to man and animals. Seed treated with diazinon, captan and thiophanate-methyl for control of insects and seed-borne diseases. DO NOT use for food or feed purposes."

Grazing: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: DO NOT store treated seed for more than one month before planting.

Environment: DO NOT contaminate any body of water.

Hazard Rating:

☠ Danger – Poison

⚠ Warning – contains the allergen soy.

For an explanation of the symbols used here see page 11.

Dividend XL RTA

Fungicide Group – 3, 4
(Refer to page 311)

Company:

Syngenta Canada – PCP#25777

Formulation:

3.37% difenoconazole, 0.27% metalaxyl-M formulated as a flowable seed treatment.

Container size - 2 x 10 L, 115 L and 450 L.

Crops, Diseases, and Rates:

Crop:	Rate per 100 Kg seed:[1]	Diseases Controlled:	Diseases Suppressed[4]:
Barley	325 to 650 mL	General seed rots[2]; seedling blight and seedling root rot caused by seed-and soil-borne *Fusarium* and soil-borne *Pythium*; *Pythium* and *Fusarium* damping-off; seed-borne *Septoria*[3]; false loose smut (*Ustilago nigra*); covered smut (*U. hordei*)	Common root rot (*Cochliobolus* spp.); *Fusarium* crown and foot rot; take-all (*Gaeumannomyces graminis var. tritici*)
Corn	325 to 650 mL	General seed rots[2]; seedling blight and seedling root rot caused by seed-and soil-borne *Fusarium* and soil-borne *Pythium*; *Pythium* and *Fusarium* damping-off	–
	325 mL	Penicillium three leaf dieback	
Oat	325 to 650 mL	General seed rots[2]; seedling blight and seedling root rot caused by seed-and soil-borne *Fusarium* and soil-borne *Pythium*; *Pythium* and *Fusarium* damping-off; covered smut (*Ustilago kolleri*); loose smut (*U. avenae*)	Common root rot (*Cochliobolus* spp.)
Rye	325 to 650 mL	General seed rots[2]; seedling blight and seedling root rot caused by seed-and soil-borne *Fusarium* and soil-borne *Pythium*; *Pythium* and *Fusarium* damping-off; seed-borne *Septoria*[3]; common bunt[6] (*Tilletia caries*); dwarf bunt[6] (*T. controversa*)	Common root rot (*Cochliobolus* spp.); *Fusarium* crown and foot rot; take-all (*Gaeumannomyces gramini var. tritici*)
Triticale	325 to 650 mL	General seed rots[2]; seedling blight and seedling root rot caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*; *Pythium* and *Fusarium* damping-off; loose smut (*Ustilago tritici*)	Common root rot (*Cochliobolus* spp.); *Fusarium* crown and foot rot; take-all (*Gaeumannomyces gramini var. tritici*)

See footnotes on following page.

Continued...

Crops, Diseases, and Rates *continued*:

Crop:	Rate per 100 Kg seed:[1]	Diseases Controlled:	Diseases Suppressed[4]:
Spring Wheat	325 to 650 mL	General seed rots[2]; seedling blight and root rot caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*; *Pythium* and *Fusarium* damping-off; seed-borne *Septoria*[3]; common bunt[6] (*Tilletia tritici, T. laevis*); loose smut (*Ustilago tritici*)	Common root rot (*Cochliobolus* spp.); *Fusarium* crown and foot rot; take-all (*Gaeumannomyces gramini var. tritici*)
Winter Wheat	325 to 650 mL	General seed rots[2]; seedling blight and seedling root rot caused by seed-and soil-borne *Fusarium* and soil-borne *Pythium*; *Pythium* and *Fusarium* damping-off; seed-borne *Septoria*[3]; *Septoria* leaf blotch[3,5]; common bunt[6]; (*Tilletia tritici, T. laevis*); dwarf bunt[6] (*T. controversa*); loose smut (*Ustilago tritici*)	Common root rot (*Cochliobolus* spp.); *Fusarium* crown and foot rot; take-all (*Gaeumannomyces gramini var. tritici*)
Buckwheat, millet, sorghum	325 to 650 mL	General seed rots[2]; seedling blight and seedling root rot caused by seed-and soil-borne *Fusarium* and soil-borne *Pythium*; *Pythium* and *Fusarium* damping-off	–

[1] Use the higher rate where conditions favour seed-or soil-borne pathogens or if field has history of high disease pressure.

[2] General seed rots controlled include those caused by saprophytic organisms such as *Penicillium*, *Aspergillus*, *Fusarium*, and *Pythium*. Use the 325 mL rate for control of these diseases.

[3] Use the 650 mL rate for control of these diseases.

[4] Suppression means consistent control at a level which is not optimal but is still of commercial benefit.

[5] Early season foliar disease control for first 4 weeks after planting. For full season control apply a foliar fungicide according to label directions.

[6] Controls both seed- and soil-borne bunts (common, dwarf).

Application Information:

Dividend XL RTA is a ready-to-apply formulation for use in commercial seed treatment plants, and for on-farm treatment using standard gravity flow or mist-type seed treatment equipment which accurately meters and mixes a flowable seed treatment. *Dividend XL RTA* may also be used in a treat-on-the-go air seeder. The equipment must provide uniform coverage of product on the seed. Consult the manufacturer of the application equipment for suitability for this application and for instructions on operation and calibration of the equipment.

Uneven seed coverage may not give the desired level of disease control.

Water Volume: *Dividend XL RTA* does not require addition of water for application. However, when using the Flexi-Coil Seed Treatment Unit, *Dividend XL RTA* must be diluted with water to reach 99 mL per 10 kg of seed. The recommended dilution rate is 1 part *Dividend XL RTA* to 2 parts water. This is equal to 33 ml of *Dividend XL RTA* plus 66 ml of water in order to achieve the total liquid volume requirement of 99 ml per 10 kg seed.

How it Works:

The active ingredient difenoconazole is a triazole fungicide with broad-spectrum, systemic activity. Metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes class, including *Pythium* damping-off. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

For the control of true loose smut (*Ustilago nuda*) in barley, tank mix *Dividend XL RTA* with *Charter, Raxil 250FL* or *Baytan 30*. Read the label directions for each product and follow the more restrictive label precautions and limitations.

Restrictions:

Resistance management: Refer to page 309.

Labelling: Treated seed should be labelled "This seed has been treated with *Dividend XL RTA*; DO NOT use for food, feed, or oil purposes."

Grazing: DO NOT graze, feed green forage or cut for hay within 35 days of planting treated cereal grain seeds.

Re-cropping: DO NOT plant any crop other than cereal grains listed on this label within 30 days to fields in which treated seeds were planted.

Storage: Keep in heated storage. Product will freeze at -18°C. Store away from feeds and food stuffs. DO NOT carry-over treated seed.

Environment: This product is toxic to fish and other aquatic invertebrates. DO NOT apply directly to water or to areas where surface water is present. DO NOT contaminate food, feed, domestic or irrigation water supplies, lakes, streams and ponds. If treated seed is spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion.

Hazard Rating:

None listed.

Gaucho CS FL

***Gaucho CS FL* is available to commercial seed treaters only.**

Fungicide Group – 7, M3
Insecticide Group – 4A
(Refer to page 311 and 441)

Company:

Bayer CropScience – PCP#27174

Formulation:

285.7 g per L imidacloprid, 47.6 g per L carbathiin, 95.3 g per L thiram formulated as a suspension.

Container sizes - 10, 100, 1000 L.

Crops, Diseases, Insects and Rates:

Crop:	Rate (ml) per 100 Kg seed[1]	Insects Controlled[2]:	Diseases Controlled:
Canola, rapeseed, and mustard (including oilseed mustard)	1400 to 2100 mL	Early season control of flea beetles.	Seed rot, damping off, seedling blight and early season root rot caused by *Rhizoctonia, Pythium* and *Alternaria* spp.; Seed-borne blackleg (*Leptosphaeria maculans*)[3]

[1] In areas where flea beetle populations are often high, use the higher rates.
[2] Under high insect pressure, a foliar insecticide may also be required. Monitor crop regularly for insect infestation levels.
[3] In canola and rapeseed only.

Application Information:

For use in commercial seed treaters only. Seed treatment must be thoroughly agitated to ensure uniform mixing of product prior to and during application. DO NOT apply direct heat to container. These products DO NOT contain colourant. A blue colourant must be added when products are applied to oilseeds. Treatment of highly mechanically scarred or damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour.

How it Works:

Imidacloprid is a chloronicotinyl insecticide with systemic activity. For more information refer to "Insecticide Groups Based on Modes of Action" on page 400. Carbathiin is a carboximide fungicide with systemic activity and thiram is a dithiocarbamate fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 309.

Labelling: Treated seed must be labelled as follows: "This seed has been treated with *Gaucho CS FL* seed protectant, which contains imidacloprid, carbathiin and thiram. Do not use for food, feed or oil processing. Store away from feeds and other foodstuffs. Wear a long-sleeved shirt, long pants and chemical-resistant gloves when handling treated seeds."

Grazing: DO NOT graze or feed livestock on treated areas for 4 weeks after planting.

Re-cropping: No restrictions listed.

Storage: Protect products from freezing. Keep above 10°C prior to and during application. DO NOT store in direct sunlight or above 35°C. Treated seed stored for periods in excess of 9 months should be tested for germination before planting. DO NOT store treated seed above 25°C or in direct sunlight.

Environment: These products are highly toxic to birds and aquatic invertebrates. DO NOT apply directly to water or to areas where surface water is present. DO NOT contaminate water when disposing of equipment wash water. Cover or incorporate spilled treated seeds. Leftover treated seed should be double sown around the headlands, or buried away from water sources.

Hazard Rating:

Caution – Poison

For an explanation of the symbols used here see page 11.

Gemini

Fungicide Group – 3, M4

(Refer to page 311)

Company:

BASF Canada – PCP#27826

Formulation:

1.25% triticonazole and 12.5% thiram formulated as a liquid flowable seed treatment. Container size - 2 x 6 L; 200 L.

Crops, Rates and Diseases:

Crop:	Rate (ml) per 100 Kg seed	Diseases Controlled:	Diseases Suppressed*:
Wheat	360 mL	Seed rot caused by *Fusarium* spp.; seedling blights caused by seed and soil-borne *Fusarium* spp.; loose smut (*Ustilago tritici*); common bunt (*Tilletia tritici, T. laevis*); *Pythium* damping off	*Fusarium* crown and root rot; seedling blight and common root rot caused by *Cochliobolus* sp.
Barley	360 mL	Seed rot caused by *Fusarium* spp.; seedling blights caused by seed and soil-borne *Fusarium* spp.; true loose smut; (*Ustilago nuda*); covered smut (*U. hordei*); false loose smut (*U. nigra*); *Pythium* damping off	*Fusarium* crown and root rot; seedling blight and common root rot caused by *Cochliobolus* sp.
Oats	360 mL	Loose smut (*Ustilago avenae*), covered smut (*U. kolleri*)	–

* Suppression means consistent control at a level which is not optimal but is still of commercial benefit.

Application Information:

Gemini is a ready-to-use seed treatment for use in commercial seed treatment plants and for use in on-farm standard gravity flow or mist type treatment machines. *Gemini* can also be used in on-the-go air seeder treatment systems. Agitate or shake well prior to usage.

Water volume: *Gemini* does not require the addition of water for application. When using the Flexi-Coil "on-the-go" seed treatment unit, please contact BASF AgSolutions at 1-877-371-2273 for details on product rates.

How it Works:

The active ingredient triticonazole is a triazole fungicide with broad-spectrum systemic activity. Thiram is a dithiocarbamate fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 309.

Labelling: Treated seed must be labelled "This seed is treated with *Gemini* seed treatment fungicide containing triticonazole and thiram. DO NOT use for food, feed or oil processing".

Grazing: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: Store in original container with lid tightly closed. Store away from children, animals, food, feed stuffs, fertilizers and seed. Protect from frost and freezing. DO NOT store treated seed for more than 18 months. Store treated seed in cool, dry conditions.

Environment: DO NOT feed treated seed to, or otherwise expose, wildlife or domestic birds. DO NOT contaminate domestic or irrigation water supplies, lakes, streams, ponds or any body of water with the chemical, used containers, treated seed or bags. DO NOT contaminate water by cleaning of equipment or disposal of wastes.

Hazard Rating:

Caution – Poison

Caution – Eye irritant and potential skin sensitizer

For an explanation of the symbols used here see page 11.

General Storage Disinfectant

Company:

Ag-Services Inc (Distributed by United Agri Products) – PCP#14957

Formulation:

10% dimethyl benzyl ammonium chloride, formulated as a liquid. Container size - 20 L.

Crops:

Use for disinfecting storage areas and equipment. Not for direct use on potatoes.

Diseases:

Control of bacterial ring rot and other decay organisms in potato storage.

Rate:

60 mL per 10 L water.

Application Information:

Apply only when storage areas are empty. To disinfect walls and floors of potato storages, clean surfaces thoroughly with a broom or vacuum to remove all dirt and debris. Wash with detergent prior to disinfecting. Then, wash, mop or spray thoroughly with disinfectant solution (60 mL disinfectant in 10 L of water). Allow treated surfaces to remain wet for at least 20 minutes. The same strength solution can be used to disinfect used bags, potato planters and other machinery after all dirt has been removed. Soak bags for at least 1 hour.

Equipment: All handling and planting equipment should be cleaned and treated on a regular basis (daily when preparing seed and seed pieces). Dirt should be removed through washing with detergent prior to disinfection. Treat equipment by mopping and brushing methods.

Storage walls and ceilings: Use 600 mL of disinfectant in 100 L of water. Wash areas with detergent prior to disinfecting. Spray areas using a high pressure jet (up to 4250 kPa pressure) to penetrate cracks, etc. in floors. Spray storage air ducts with a solution of 1.2 L of disinfectant in 100 L of water. Sub-surface air ducts, flumes and plenums should be thoroughly cleaned prior to disinfection.

Tank Mixes:

DO NOT mix with soaps, detergents, foaming agents or surfactants.

Hazard Rating:

▽ Caution – Corrosive

Other precaution: Corrosive, causes severe eye and skin damage. DO NOT get in eyes, on skin or on clothing. Avoid contamination of food. DO NOT breathe mist of diluted chemical created from pressure washer applications. Wear gloves, goggles, rubber boots, wet suit, and mist respirator when using pressure washer system.

For an explanation of the symbols used here see page 11.

Helix Vibrance

Fungicide Group – 3, 4, 12, 7
Insecticide Group – 4A
(Refer to page 311 and 441)

Available to commercial seed treaters only.

***Helix Vibrance* is a co-pack of *Helix Xtra* (thiamethoxam insecticide, and difenoconazole, metalaxyl-M, and fludioxonil fungicides, page 406) and *Vibrance 500FS* (sedaxane, page 431). Information listed is limited to crop, diseases, insects and rates. For other detailed information on the component products see the product pages listed above.**

Company:

Syngenta Canada

Formulation:

Helix Xtra (PCP #26638): 20.7% thiamethoxam, 1.25% difenoconazole, 0.39% metalaxyl-M, 0.13% fludioxonil formulated as a liquid seed treatment.

Vibrance 500FL (PCP #30438): 500 g/L sedaxane formulated as a suspension.

Container size - 105 L to Bulk.

Crops:

Canola, Oriental mustard (both oilseed and condiment types).

Diseases Controlled:

Seed-borne blackleg (*Leptosphaeria maculans*), seed-borne *Alternaria*, and the seedling disease complex (damping off, seedling blight, seed rot, root rot) caused by *Pythium*, *Fusarium* and *Rhizoctonia* spp. Early season control of flea beetles (28 to 35 days).

Rate:

1.5 L *Helix Xtra* and 5 to 10 mL *Vibrance 500FS* per 100 kg seed.

Hazard Rating:

☠ Caution – Poison

For an explanation of the symbols used here see page 11.

Helix XTra

Fungicide Group – 3, 4, 12
Insecticide Group – 4A
(Refer to page 311 and 441)

Available to commercial seed treaters only.

Company:

Syngenta Canada – PCP#26638

Formulation:

20.7% thiamethoxam, 1.25% difenoconazole, 0.39% metalaxyl-M, 0.13% fludioxonil formulated as a liquid seed treatment.
Container size - 105 L to Bulk.

Crops:

Canola, Oriental mustard (both oilseed and condiment types).

Diseases Controlled:

Seed-borne blackleg (*Leptosphaeria maculans*), seed-borne *Alternaria*, and the seedling disease complex (damping off, seedling blight, seed rot, root rot) caused by *Pythium*, *Fusarium* and *Rhizoctonia* spp.

Insects Controlled:

Early season control of flea beetles (28 to 35 days).

Rate:

1.5 L per 100 kg seed.

Application Information:

For use only in commercial seed treatment facilities with closed transfer systems. *Helix XTra* is a ready to use liquid product and contains an appropriate colourant. Apply using standard commercial seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of insect or disease control. Consult the manufacturer of the seed treating equipment for advice on the operation and calibration of the equipment. Maintain constant agitation during the seed treatment process. Allow the seed to dry before bagging.

How it Works:

The active ingredient thiamethoxam is a systemic insecticide from the neonicotinoid chemical class. For more information refer to "Insecticide Groups Based on Modes of Action" on page 441. The active ingredient difenoconazole is a triazole fungicide with broad-spectrum systemic activity. The active ingredient metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes class, including Pythium damping off. The active ingredient fludioxonil is a phenylpyrrole chemistry and has contact and locally systemic activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 399.

Labelling: Treated seed must be labelled "This seed has been treated with *Helix XTra* which contains insecticide (thiamethoxam) and fungicides (difenoconazole, metalaxyl-M and S-isomer, and fludioxonil). Wear long-sleeve shirt, long pants, and chemical-resistant gloves when handling treated seed. Do not use for food, feed or oil processing. Store away from food and feed."

Grazing: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: Store in a well-ventilated, secure area. Store away from food and feed.

Environment: DO NOT apply directly to water, or to areas where surface water is present. In cleaning of equipment or disposing of wastes, DO NOT contaminate water used for human or animal consumption or by wildlife and aquatic life or for irrigation purposes. If treated seed is spilled outdoors, promptly clean up.

Hazard Rating:

▽ Caution – Poison

For an explanation of the symbols used here see page 11.

Imidacloprid

Insecticide Group – 4A
(Refer to page 441)

Admire SPT / Alias 240 SC / Sombrero 600 FS

Company:

Bayer CropScience (*Admire SPT* – PCP#27702)

MANA Canada (*Alias 240 SC* -PCP#28475 and *Sombrero 600FS* – PCP#30505)

Formulation:

Admire and *Alias:* 240 g per L imidacloprid.
Container sizes - 1 L, 3.78 L. Contains insecticide only.

Sombrero: 600 g per L imidacloprid.
Contains insecticide only.

Crops and Insects:

Product:	Crop:	Insects Controlled:	Rate:
Admire and *Alias*	Potato	Colorado potato beetle, potato flea beetle, potato leafhopper and aphids (including green peach, buckthorn, foxglove and potato aphid)	26 to 39 ml per 100 kg of potato seed tubers. The higher rate is recommended when extended length of control is needed. DO NOT apply more than 0.47 L per acre per year.
Sombrero	Canola, mustard (condiment-type only) and rapeseed	Flea beetles	667 ml per 100 kg seed to 1333 mL per 100 kg seed
	Corn	Corn flea beetle	21.3 mL product per 80,000 seeds.
		Wireworms	80 mL product per 80,000 seeds.

Application Information:

May be applied when potato pieces are being cut. Apply specified dosage as a diluted spray onto seed-pieces using a shielded spray system that is well contained and will prevent the loss of any liquid. DO NOT dilute with any more than 3 parts water to 1 part *Admire SPT/ Alias 240 SC*. DO NOT dilute *Sombrero* beyond 6%. Agitate or stir spray solution as needed. Complete coverage of the seed piece is required for optimal insect control. As part of the seed cutting and treating process, application of a fungicide registered for potato seed treatment or an inert absorbent ingredient is recommended.

NOTE: A colourant must be added to *Sombrero* to colour seed in accordance with the Pest Control Products Act and the Seeds Act Regulations. A blue colourant must be added when this product is applied to an oilseed.

How it Works:

Imidacloprid is a chloronicotinyl insecticide with systemic activity. For more information refer to "Insecticide Groups Based on Modes of Action" on page 400.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 399.

Labelling: All bags containing *Sombrero*-treated seed must be labeled or tagged as followed: "This seed has been treated with *Sombrero 600FS*, which contains imidacloprid. Do not use for feed, food, or oil processing. Store away from feeds and other foodstuffs".

Grazing: Cover crops that are used as a rotational crop without a plant-back interval following treatment should not be grazed or harvested for food or feed. Do not graze or feed livestock on areas treated with *Sombrero* for four weeks after planting. Mustard greens grown or harvested from *Sombrero*-treated seed must not be used for human consumption.

Re-cropping: Use a minimum plant-back interval of 30 days for cereals, 9 months for peas and beans, and 12 months for all other food and feed crops. Green manure and other cover crops not intended for human or animal consumption do not require a plant-back interval following treatment. DO NOT graze or harvest cover crops for food or feed. It is not recommended that this product be used in fields treated with imidacloprid during the previous season. DO NOT apply any subsequent application of imidocloprid in furrow or foliar application, or any other Group 4 insecticide following *Admire SPT/ Alias 240 SC* treatment.

Storage: Store product in cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food and feed. Store in original container and out of reach of children. Carry-over of *Sombrero*-treated seed is not recommended (treated canola, rapeseed or mustard (condiment-type only) seed stored for periods in excess of 6 months may decrease at a faster rate than untreated seed). Test seed germination if stored for more than 6 months. Do not store *Sombrero*-treated seed above 25C or in direct sunlight.

Environment: DO NOT plant treated seed pieces when rainfall is forecast for the next 48 hours. DO NOT plant treated seed pieces within 15 metres of well-head or aquatic systems, including marshes, ponds, ditches, streams, lakes, etc. This product is toxic to wildlife. Keep out of lakes, streams, ponds, or other aquatic systems. DO NOT contaminate water when disposing of equipment wash waters. Leftover treated seed should be double sown around the headland, or buried away from water sources such as lakes, streams, ponds or other aquatic systems.

Hazard Rating:

☠ Caution – Poison

For an explanation of the symbols used here see page 11.

Kocide 2000

Fungicide Group – M1
(Refer to page 311)

Company:

E.I. du Pont Canada Company – (PCP#27348)

Formulation:

35% copper as copper hydroxide formulated as a dry flowable.

Container size - 10 to 25 kg..

Crops, Diseases and Timing:

User requested minor use label expansion (URMULE) for use as a seed treatment on beans. For suppression of the following seed borne diseases; common blight (*Xanthomanos axonopodis pv. phaseoli*), halo blight (*Pseudomonas syringae pv. phaseolicola*) and bacterial brown spot (*Pseudomonas syringae pv. syringae*), in dry edible beans and succulent beans.

Rate:

For every 100 kg seed to be treated, add 113 g *Kocide 2000* to 200 ml of warm water and stir until dissolved. Ensure even coverage and allow treated seed to dry before planting.

Application Information:

Kocide 2000 used as a seed treatment may cause some delay in seed germination. Treat a small quantity of seed using equipment similar to that planned for treating the total seed lot. Conduct germination tests on a small portion of seed before committing the total seed lot to a selected seed treatment.

All seed treated with this product must be conspicuously coloured at the time of treatment. When handling contaminated equipment or treated seed, wear long sleeved coveralls over normal work clothing, chemical resistant gloves and goggles; use an approved respirator with a canister approved for pesticides to minimize exposure to dust when handling, mixing leading product, bagging seed, sewing bags of treated seed or when transferring treated seed to a storage bin.

Refer to the label for additional application instructions and/or use precautions regarding this URMULE.

How it Works:

The active ingredient copper hydroxide is an inorganic fungicides with contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 309.

Labelling: Treated seed must be labeled as follows: "This seed has been treated with *Kocide 2000*; DO NOT use treated seed for food, feed or oil processing."

Grazing: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: Store in cool, dry, ventilated area, away from feed or food. Keep away from heat, fire and sparks.

Environment: DO NOT apply or allow to drift onto streams or any body of water.

Hazard Rating:

▽ Caution – Poison

◇ Warning – Eye irritant

For an explanation of the symbols used here see page 11.

Mancozeb

Fungicide Group – M3
(Refer to page 311)

Potato ST 16 / Solan MZ / Tuberseal

Company:

Norac Concepts Inc. (*Solan MZ* – PCP#29377, *Tuberseal* – PCP#17042)

Wilbur-Ellis Co., distributed by United Agri Products (*Potato ST 16* – PCP#24734)

Formulation:

16% mancozeb formulated as a powder. Container size - 10 kg (*Tuberseal*); 20 kg (*Solan MZ* and *Potato ST 16*).

Crops and Disease:

Control of *Fusarium* seed piece decay in potatoes.

Rates:

500 g per 100 kg seed.

Application Information:

Apply product before planting; thoroughly coat surface of whole or cut seed with dust. If treated whole seed is cut, make a second application to protect cut surfaces. Plant as soon as possible after treating. If cut seed is not planted within two days of treating, store in a ventilated location to allow cut surfaces to dry.

How it Works:

The active ingredient mancozeb is a dithiocarbamate fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 309.

Labelling: Treated seed pieces should be labelled "Poisonous to man and animals. This seed has been treated with mancozeb for the control of fusarium decay. Do not use for food or feed purposes."

Grazing: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: Store product in a cool, dry, well-ventilated place. Keep away from fire and sparks.

Environment: DO NOT contaminate feed or food. DO NOT contaminate any body of water.

Hazard Rating:

None listed.

Maxim D/Maxim Liquid PSP/Maxim PSP/Maxim MZ PSP

Fungicide Group –
Maxim D – 12, 3
Maxim Liquid PSP,
Maxim PSP - 12
Maxim MZ PSP - 12, M4
(Refer to page 311)

Company:

Syngenta Canada (*Maxim D* – PCP #30599; *Maxim Liquid PSP* – PCP #29110; *Maxim PSP* – PCP#26647; *Maxim MZ PSP* – PCP#27965)

Formulation:

Maxim D: 19.4 g per L fludioxonil and 19.4 g per L difenconazole formulated as a suspension.

Maxim Liquid PSP: 40.3% fludioxonil net contents 1 L to 55 L.

Maxim PSP: 0.5% fludioxonil formulated as a dry powder. Container size 10 kg.

Maxim MZ PSP: 0.5% fludioxonil plus 5.7% mancozeb formulated as a dry powder. Container size - 10 kg, 20 kg, 22.7 kg.

Crops and Diseases Controlled:

Seed piece treatment fungicide for use on potato for the control of black scurf/stem and stolon canker (*Rhizoctonia solani*), silver scurf (*Helminthosporium solani*), and fusarium dry rot (*Fusarium* spp.). These products do not control bacterial diseases present within the seed.

Rate:

Maxim D: 130 mL per 100 kg of seed for control of black scurf/stem and stolon canker and silver scurf; 65-130 mL per 100 kg of see for control of fusarium dry rot (use the high rate when disease pressure and/or resistance pressure is high).

Maxim Liquid PSP: 5.2 mL per 100 kg of seed.

Maxim PSP; Maxim MZ PSP: Use 500 g per 100 kg of cut seed. One 10 kg bag treats 2000 kg of seed.

Application Information:

Maxim D: Shake or mix well before using. Apply using standard seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. When applying at a rate of 130 mL/100 kg seed, *Maxim D* may be applied undiluted or as a water-based slurry. DO NOT exceed a maximum slurry volume of 260 mL per 100 kg seed. When applying at rates lower than 130 mL of *Maxim D* per 100 kg seed, add sufficient water to allow for a slurry volume of at least 130 mL per 100 kg seed. Follow manufacturer's application instructions for the seed treatment equipment used.

Maxim Liquid PSP: Shake or mix well before using. Apply as a water-based slurry utilizing standard slurry seed treatment equipment which provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Thoroughly mix the recommended amount of seed treatment into the required amount of water for the slurry treater and dilution rate to be used. Follow the manufacturer's application instructions for the seed treatment equipment being used. Maintain constant agitation of the slurry during the treatment. Consult the label for more information on seed piece treatment application procedures.

Maxim PSP; Maxim MZ PSP: Apply using appropriate treater designed for treating potatoes or by dust attachment over belt. Cut pieces should be treated immediately after cutting. If treated seed pieces are bagged, they should be stored for 2 to 3 days in open crates before bagging. For optimum protection against silver scurf, ensure that seed tubers are completely free of soil. Total skin coverage is essential.

How it Works:

Fludioxonil is a phenylpyrrole fungicide with contact activity. Mancozeb is a dithiocarbamate fungicide with contact activity. The active ingredient difenoconazole is a triazole fungicide with broad-spectrum systemic activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

For control of potato diseases and insects, *Maxim Liquid PSP* fungicide seed protectant can be tank-mixed with *Actara 240* insecticide. Consult each label for pests controlled, precautions, and specific application instructions. For control of Colorado potato beetle, aphids and potato leafhopper, *Maxim D* can be tank-mixed with *Cruiser Potato Seed Piece Treatment*. Refer to product labels for specific application instructions and precautions. Follow the most restrictive label precautions and limitations.

Restrictions:

Resistance management: Refer to page 309.

Labelling: No restrictions listed.

Grazing: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: Ideal storage temperature for the product is above freezing and below 30°C. Store in a dry place. Avoid contamination of feed.

Environment: This product is toxic to fish and aquatic invertebrates. DO NOT apply directly to water, or to areas where surface water is present. In cleaning of equipment or disposing of wastes, DO NOT contaminate water used for human or animal consumption or by wildlife and aquatic life or for irrigation purposes.

Hazard Rating:

▽ Caution – Poison

Other precautions: Keep out of reach of children. May be harmful if swallowed. Avoid inhalation of dust, vapour and/or spray mist. Wash hands and face after handling and before eating or smoking. Avoid contamination of feed and foodstuffs. Treated seed must not be used for food, feed or oil processing. Treat seed in a well-ventilated area. When handling, contaminated equipment or treated seed, wear long-sleeved coveralls over long pants and long-sleeved shirt and chemical-resistant gloves plus goggles.

For an explanation of the symbols used here see page 11.

Maxim Quattro

Fungicide Group – 1, 4, 11, 12

(Refer to page 311)

Available to commercial seed treaters only.

Company:

Syngenta Canada – PCP#29871

Formulation:

26.5% thiabendazole, 3.32% fludioxonil, 2.65% metalaxyl-M and S-isomer, 1.33% azoxystrobin formulated as a liquid suspension seed treatment.

Container size - 5 L to Bulk.

Crops and Diseases:

Control of seed- and soil-borne *Pythium, Rhizoctonia,* and *Fusarium* (including *F. graminearum* and *F. verticillioides*) and weakly pathogenic *Aspergillus* and *Penicillium* causing seed rot/pre-emergence damping-off, post-emergence damping-off, and seedling blight on corn.

Rate:

67 mL per 100 kg seed.

Application Information:

For use by a commercial seed treater only. Mix with water to form a slurry seed treatment. Contains no colourant; an appropriate colourant must be added to slurry before treating seed. Maintain constant agitation of slurry. Allow seed to dry before bagging. Treatment of highly mechanically damaged, poor quality or low vigour seed may result in reduced germination and/or reduced seed and seedling vigour. If seed lot quality is unknown conduct a germination test prior to treating.

How it Works:

The active ingredient thiabendazole is a benzimidazole fungicide with contact and systemic activity. The active ingredient fludioxonil is a phenylpyrrole fungicide with contact and locally systemic activity. The active ingredient metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes class, including *Pythium* damping off. The active ingredient azoxystrobin is a methoxyacrylate (strobilurin) fungicide with broad spectrum activity to be used as a preventative and curative fungicide. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 309.

Labelling: Treated seed must be labelled "This seed has been treated with thiabendazole, fludioxonil, metalaxy-M and S-isomer, and azoxystrobin. Use chemical resistant-gloves when handling treated seed. DO NOT use for food, feed or oil processing. Store away from feed and foodstuffs. DO NOT graze corn or cut for forage within 30 days of planting."

Grazing: DO NOT graze or feed livestock on treated areas within 30 days of planting.

Re-cropping: No restrictions listed.

Storage: Store product between 0°C and 30°C. Repeated freeze-thawing of the product will not compromise its integrity. If the product should freeze, bring the product back to room temperature and ensure thorough mixing before use. Store away from food and feed.

Environment: DO NOT apply directly to water, or to areas where surface water is present. In cleaning of equipment or disposing of wastes, DO NOT contaminate water used for human or animal consumption or by wildlife and aquatic life or for irrigation purposes. If treated seed is spilled outdoors, promptly clean up.

Hazard Rating:

⚠ Caution – Potential skin sensitizer

For an explanation of the symbols used here see page 11.

Mertect SC

Fungicide Group – 1
(Refer to page 311)

Company:

Syngenta Canada – PCP#13975

Formulation:

500 g per L thiabendazole formulated as a water dispersible suspension. Container size - 4 x 5 L.

Crops and Diseases:

Post-harvest control of storage rots caused by *Fusarium, Phoma, Helminthosporium, Oospora* and *Rhizoctonia* spp. on potato.

Rate and Water Volume:

7.5 L per 170 L of water. Spray 2 L of this suspension per 1 metric tonne of potatoes.

Application Information:

Post-harvest treatment. Shake well before using. DO NOT allow suspension to stand without continuous agitation. Potatoes must rotate along conveyor line to ensure complete coverage. Prior to treating potatoes destined for export, confirm with authorities that treated potatoes will be allowed to enter importing country.

How it Works:

The active ingredient thiabendazole is a benzimidazole fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 309.

Labelling: No restrictions listed.

Grazing: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: Minimum storage temperature 0°C.

Environment: Toxic to aquatic organisms. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Do not discharge effluent containing this product into sewer systems, lake, streams, ponds, estuaries, oceans, and other waters.

Hazard Rating:

None listed.

Metalaxyl

Fungicide Group – 4
(Refer to page 311)

Allegiance FL/Belmont 2.7FS

Company:

Bayer CropScience (*Allegiance FL*– PCP#26674)
Chemtura Canada Co. (*Belmont 2.7 FS* – PCP#30246)

Formulation:

317 g per L metalaxyl formulated as a liquid seed treatment.
Allegiance FL container size - 4 X 3.79 L.
Belmont 2.7 FS container size – 500 mL, 10 L and 200 L.

Crops, Diseases and Rates*:

Crop	Disease Controlled:	Application Rates** (mL per 100 kg seed treated):	Water Volume (mL required to make up a total volume of 500 mL):
Chickpea, dry pea	Seed rots and seedling blights caused by *Pythium* spp.	16 to 110	484 to 390
Canola (rapeseed)	Seed rots and seedling blights caused by *Pythium* spp.	32 to 110	468 to 390
Alfalfa, bean, clover, corn, sainfoin, vetch	Seed rots and seedling blights caused by *Pythium* spp.	46 to 110	454 to 390
Grasses (forage)	Seed rots and seedling blights caused by *Pythium* spp.	46 to 93	454 to 407
Grasses (turf)	Seed rots and seedling blights caused by *Pythium* spp.	93	407
Soybean	Seed rots and seedling blights caused by *Pythium* spp., early season *Phytophthora*	46 to 93	454 to 407
Sunflower	Seed rots and seedling blights caused by *Pythium* spp., downy mildew	110 to 189***	390 to 311
Low tannin lentil****	Seed rots and seedling blights caused by *Pythium* spp.	16	484

* Rates for crops processed in Canada.

** Use the high rate if planting into cold, wet soils, if the seed is of poor quality, or if disease pressure is expected to be high.

*** High rate is for downy mildew control.

**** For use on low tannin lentils destined export or seed production only.

Crops, Diseases and Rates* *continued*:

Crop	Diseases Controlled:	Application Rates** (mL per 100 kg seed treated):	Water Volume(mL required to make up a total volume of 500 to 620 mL):
Corn	Downy mildew (*Sclerophthora macrospora*)	189 to 620	311 to 0
Pea	Downy mildew (*Peronospora viciae*)	146	354
Sunflower	Downy mildew (*Plasmopora halstedii*)	620	0
Cereals (wheat, barley, oats, rye)	Seed rots and seedling blights caused by *Pythium* spp.	46 to 110	454 to 390
Sorghum	Seed rots and seedling blights caused by *Pythium* spp.	93 to 110	407 to 390
Sorghum	Downy mildew (*Perenosclerospora sorghi*)	189	311
Bird's-foot trefoil	Seed rots and seedling blights caused by *Pythium* spp.	46 to 110	454 to 390
Low-tannin lentil	Seed rots and seedling blights caused by *Pythium* spp.	16	484

* Rate for crops to be exported.

**Use the high rate if planting into cold, wet soils, if the seed is of poor quality, or if disease pressure is expected to be high.

Application Information:

Mix with water to form a slurry seed treatment. Contains no colourant; an appropriate colourant must be added to slurry before treating seed. Maintain constant agitation of slurry. Allow seed to dry before bagging. Treatment of highly mechanically damaged, poor quality or low vigour seed may result in reduced germination and/or reduced seed and seedling vigour. If seed lot quality is unknown conduct a germination test prior to treating.

How it Works:

The active ingredient metalaxyl is an acylalanine fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 309.

Labelling: Treated seed must be labelled as follows; "This seed has been treated with *Allegiance FL* or *Belmont 2.7 FS* seed protectant which contains metalaxyl. DO NOT use for feed, food or oil processing." All bags containing seed for export must be labelled "FOR EXPORT ONLY."

Grazing: DO NOT graze or feed livestock on treated areas for 4 weeks after planting.

Re-cropping: No restrictions listed.

Storage: DO NOT store above 35°C or below 0°C. Store in original container, away from pesticides, food or feed.

Environment: Treated seed may be toxic to birds and other wildlife. Clean up any spilled seeds and ensure seed is properly incorporated at planting.

Hazard Rating:

⚠ Warning – Skin and eye irritant

For an explanation of the symbols used here see page 11.

Polyram 16D

Fungicide Group – M3
(Refer to page 311)

Company:

BASF Canada – PCP#25867

Formulation:

16% metiram formulated as dust. Container size - 20 kg.

Crops and Diseases:

Control of *Fusarium* seed piece decay; seed-borne common scab (*Streptomyces* spp.) on potato.

Rates:

450 to 650 g per 100 kg seed. One container treats 2,222 to 1,538 kg of seed.

Application Information:

Apply to entire surface of seed pieces after cutting. Treated potato seed should not be allowed to stand in hot sun or drying wind. Seed should not be planted into hot, dry soil or into cold, wet soil. Plant as soon as possible after treating. If not planted immediately, provide sufficient ventilation to allow cut surface to dry. If not cutting seed, treat at same rate for control of seed-borne common scab, apply a second application to control fusarium seed piece decay.

How it Works:

The active ingredient metiram is a dithiocarbamate fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 309.

Labelling: No restrictions listed.

Grazing: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: Store product in cool, dry, locked, well-ventilated area without floor drain. Keep away from heat, fire or sparks. DO NOT allow product to become wet or overheated as this will reduce its effectiveness and may create flammable vapours. Protect from freezing. DO NOT ship or store near food, feed, seed or fertilizers.

Environment: DO NOT contaminate domestic or irrigation water, lakes, streams or ponds by the cleaning of equipment or the disposal of wastes.

Hazard Ratings:

None listed.

Proseed

Fungicide Group – 12
(Refer to page 311)

Proseed **is available to commercial seed treaters only**

Company:

Syngenta Canada – PCP#29814

Formulation:

40.3% fludioxonil formulated as a seed treatment solution. Container size - 1 L to bulk.

Crops and Diseases:

Protection of wheat, barley, oat, rye, corn, triticale, sorghum, and buckwheat seed and seedlings from seed- and soil-borne fungi which cause seed decay, damping-off, and seedling blights including *Fusarium* spp. and *Rhizoctonia* spp.

Rate:

5.2 to 10.4 ml per 100 kg of seed.

Note: use higher rates for crop/cultivars that are more susceptible to pathogens or when higher disease pressure is expected.

Application Information:

For use in commercial seed treatments facilities only. Apply as a water-based slurry using standardized equipment to ensure uniform seed coverage. Maintain constant agitation of the slurry during treatment. Allow seed to dry before bagging. This product contains no colourant. A red colourant must be added when this product is applied to grain.

How it Works:

Fludioxonil is a phenypyrolle fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Proseed may be mixed with *Apron XL* seed treatment for control of diseases caused by *Pythium* spp. and *Phytophthora* spp. provided *Apron XL* is registered on that crop.

Follow the label directions for each product and use the most restrictive precautions and limitations for either product.

Restrictions:

Resistance management: Refer to page 309.

Labelling: All bags containing treated seed for sale or use in Canada must be labelled or tagged as follows: "This seed has been treated with fludioxonil fungicide (or fludioxonil and metalaxyl-M fungicide if appropriate). DO NOT use for feed, food or oil purposes. Store away from feeds and foodstuffs. DO NOT graze treated crops, or cut for forage, within 30 days of planting."

Grazing: DO NOT graze or feed livestock on treated areas for 30 days after planting.

Re-cropping: No restrictions listed.

Storage: Store in temperatures above freezing and below 30°C.

Environment: This product is toxic to fish and other aquatic organisms. DO NOT apply this product directly to water, or to areas where surface water is present. In cleaning of equipment or disposing of wastes, do not contaminate water used for human or animal consumption, or by wildlife and aquatic life, or for irrigation purposes.

Hazard Ratings:

None listed.

Prosper EverGol/ Prosper FX/ Poncho 600 FS/Titan ST

Fungicide Group –
Prosper EverGol/
Prosper FX - 4,7,11
Insecticide Group – 4
(Refer to page 311 and 441)

***Prosper EverGol*, *Prosper FX* and *Poncho 600 FS* available to commercial seed treaters only. *Titan ST* is available for on-farm seed treatment. *Poncho 600 FS* and *Titan ST* contain insecticide only.**

Company:

Bayer CropScience (*Prosper Evergol* – PCP#30363; *Prosper FX* – PCP#29159; *Poncho 600 FS* – PCP#27453; and *Titan ST 600 FS* – PCP#27449)

Formulation:

Active ingredient:	**Active ingredient strength (g per L):**			
	Prosper Evergol	***Prosper FX***	***Poncho 600 FS***	***Titan ST***
Container sizes:	3.8L-1000L, bulk	56.8L, 100L, 1000L, bulk	1L, 3.8L, 100L, 113L, 200L, 1000L	1L, 3.8L, 10L, 200L, 1000L
Clothianidin	290	285.7	600	600
Carbathiin	-	50	–	–
Penflufen	10.7	–	–	–
Trifloxystrobin	7.15	7.14	–	–
Metalaxyl	7.15	5.36	–	–

Crops, Insects, Diseases and Rates:

Product:	**Crop:**	**Rate per 100 kg of seed:**	**Insects Controlled:**	**Diseases Controlled:**
Prosper Evergol	Canola, Rapeseed, Mustard (oilseed and condiment)	1400 mL	Flea beetles	Seed rot, damping off, seedling blight and early season root rot caused by *Pythium, Rhizoctonia, Fusarium,* and seed-borne *Alternaria* spp.; seed-borne blackleg (*Leptosphaeria maculans*).
Prosper FX	Canola, Rapeseed	1400 mL		
Poncho 600 FS	Canola, Rapeseed	250, 333 or 666 mL[1]	Flea beetles	–
	Corn	33.3 to 66.6 mL of product per 80,000 units of seed (0.25 to 0.5 mg a.i. per kernel)	Wireworm; seed corn maggot; black cutworms; corn flea beetle; white grubs	–

See footnotes on following page.

Continued...

Crops, Insects, Diseases and Rates *continued*:

Product:	Crop:	Rate per 100 kg of seed:	Insects Controlled:	Diseases Controlled:
Titan ST	Potatoes	20.8 mL per 100 kg potato seed pieces	Wireworms	–
		10.4 to 20.8 mL per 100 kg potato seed pieces	Aphid (potato, green peach, foxglove and buckthorn aphids), Colorado potato beetle, potato leafhopper, potato flea beetle (overwintered adults and suppression of second generation)	–

[1] Increasing rates for low, moderate and severe flea beetle pressure.

Application Information:

Prosper Evergol, Prosper FX and *Poncho 600 FS* are for use in commercial seed treatment facilities with closed transfer systems only. *Prosper FX* and *Poncho 600 FS* DO NOT contain a colourant. An appropriate colour must be added when these products are applied. Seed treatment must be thoroughly agitated to ensure uniform mixing of product prior to and during application. Treatment of highly mechanically scarred or damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour.

Titan ST is a seed piece treatment. Apply specified rate as a diluted spray onto seed pieces using a well contained, shielded spray system to prevent the loss of any liquid. Apply only in areas with adequate ventilation or in areas equipped to remove spray mist or dust. Agitate or stir spray solution as needed. For optimal insect control good coverage of seed pieces is required. DO NOT dilute with any more than 6 parts water to 1 part *Titan ST*. Plant seed pieces as soon as possible after cutting and treating.

How it Works:

Clothianidin is a chloronicotinyl insecticide with systemic activity. For more information refer to "Insecticide Groups Based on Modes of Action" on page 400. Carbathiin is a carboxamide fungicide with systemic activity; penflufen is a carboxamide (SDHI) fungicide with systemic activity; trifloxystrobin is a strobilurin fungicide with broad spectrum preventative activity; and metalaxyl is an acylalanine fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 309.

Subsequent applications: DO NOT make any subsequent application of a group 4 insecticide (in furrow or foliar application) following treatment with any of these products.

Labelling: Treated seed must be labelled as follows: "This seed has been treated with clothianidin and/or carbathiin, penflufen and metalaxyl. DO NOT use for food, feed or oil processing. Store away from feeds and other foodstuffs."

Grazing: *Prosper FX* – Do not graze or feed livestock on seeded areas for four weeks after planting.

Re-cropping: For *Prosper Evergol, Prosper FX* and *Poncho 600 FS*, corn and canola may be replanted at any time. For *Titan ST*, corn, and canola and potatoes may be replanted at any time. For all products, a 1-year plant back interval is required for leafy, root and tuber vegetables. A 30-day plant back is required for cereals, grasses, nongrass animal feeds, soybeans and dry beans.

Storage: Protect products from freezing. DO NOT contaminate water, food or feed by storage, disposal or by cleaning of equipment. Store in a cool place. DO NOT store in direct sun- light. Store away from food or feed.. DO NOT store treated seed above 25°C or in direct sunlight. Treated seed stored for periods in excess of 9 months should be tested for germination before planting.

Environment: These products are toxic to aquatic invertebrates. DO NOT apply directly to water or to areas where surface water is present. DO NOT contaminate water when disposing of equipment wash waters. These products are toxic to birds and mammals. Any spilled or exposed seeds should be incorporated into the soil or otherwise cleaned up from the soil surface.

Hazard Rating:

☠ Warning – Poison

For an explanation of the symbols used here see page 11.

Rancona Apex

Fungicide Group – 3
(Refer to page 311)

Company:

Manufactured by Chemtura Canada Co – PCP#29176

Formulation:

4.61 g per L ipconazole formulated as a micro-dispersion liquid. Container sizes - 10 L, 200 L, 1000 L.

Crops, Diseases and Rates:

Crop:	Rate (mL) per 100 kg of seed:	Diseases Controlled:	Diseases Suppressed*:
Barley	325	General seed rots (including those caused by saprophytic organisms such as *Penicillium* and *Aspergillus*); seed rot, damping off and seedling blight (seed- and soil-borne *Fusarium*); seed rot and seedling blight (seed and soil-borne *Cochliobolus sativus*); true loose smut (*Ustilago nuda*), covered smut (*U. hordei*), false loose smut (*U. nigra*), leaf stripe (*Pyrenophora graminea*)	Common root rot *(Cochliobolus sativus)* Crown and foot rot *(Fusarium)*
	325 to 433	True loose smut (*Ustilago nuda*) control. Use the higher rate for highly infected seed lots only.	
Wheat	325	Loose smut (*Ustilago tritici*); common bunt (*Tilletia tritici, T. laevis*); seed rot and seedling blight caused by *C. sativus, Fusarium, Aspergillus,* and *Penicillium*.	
Oat	325	Loose smut (*Ustilago avenae*); covered smut (*U. kolleri*); seed rot and seedling blight caused by *Fusarium, C. sativus, Aspergillus* and *Penicillium*.	
Rye	325	Seed rot and seedling blight caused by *Fusarium, C. sativus, Aspergillus* and *Penicillium*.	
Triticale	325	Seed rot and seedling blight caused by *Fusarium, C. sativus, Aspergillus* and *Penicillium*.	

* Suppression means consistent control at a level which is not optimal but is still of commercial benefit.

Application Information:

Rancona Apex is designed to be used undiluted in commercial seed treaters and by dripper applicators. Undiluted *Rancona Apex* can be used at temperatures down to -20°C.

How it Works:

The active ingredient ipconazole is a demethylation inhibitor with systemic and contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

RANCONA Apex Fungicide may be tank mixed with *Apron XL® LS* and applied to wheat (spring or winter), barley, oats or rye. Apply *RANCONA Apex Fungicide* at any rate recommended in the table above, and apply Apron XL LS at 2.7 ml/100Kg.

Restrictions:

Resistance management: Refer to page 309.

Labelling: Treated seed must be labelled as follows "This seed has been treated with *Rancona Apex* liquid seed protectant containing ipconazole. Do not use for feed, food, or oil processing."

Grazing: DO NOT graze or feed livestock on treated area for 30 days after planting.

Re-cropping: No restrictions listed.

Storage: DO NOT store in direct sunlight or above 35°C. DO NOT freeze.

Environment: DO NOT contaminate ponds, lakes or streams.

Hazard Rating:

None listed.

Rancona RS

Fungicide Group – 3, 7
(Refer to page 311)

Company:

Manufactured by Chemtura Canada Co – PCP#30217

Formulation:

9.38 g per L ipconazole and 87.5 g per L carbathiin formulated as a liquid suspension seed treatment. Container sizes - 10 L, 1000 L.

Crops, Diseases and Rates:

Crop:	Rate (mL) per 100 kg of seed:	Diseases Controlled:	Diseases Suppressed*:
Canola, rapeseed	800	Seed rot, damping off, and seedling blight caused by *Rhizoctonia*, and *Fusarium* spp. Seed-borne blackleg (*Leptosphaeria maculans*)	Root rot caused by *Rhizoctonia* and *Fusarium* spp.

Application Information:

Rancona RS is ready to use and may be applied to seed as purchased. However, dilution with water may help to achieve more uniform seed coverage when using some types of treaters and/or when treating under dry and/or hot conditions.

How it Works:

The active ingredient ipconazole is a demethylation inhibitor with systemic and contact activity and carbathiin is a carboximide fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 309.

Labelling: Treated seed must be labelled as follows "This seed has been treated with carbathiin and ipconazole. Do not use treated seed for feed, food, or oil processing."

Grazing: DO NOT graze or feed livestock on treated area for four weeks after planting.

Re-cropping: No restrictions listed.

Storage: Store this product away from food or feed.

Environment: DO NOT contaminate ponds, lakes or streams.

Hazard Rating:

None listed.

Raxil MD

Fungicide Group – 3, 4
(Refer to page 311)

Company:

Bayer CropScience – PCP#27692

Formulation:

5.0 g per L tebuconazole and 6.6 g per L metalaxyl formulated as a flowable seed treatment. Container size - 10 L, 200 L, 1,000 L.

Crops, Rates and Diseases:

Crop:	Undiluted Use Rate: Rate per 100 kg of Seed	Undiluted Use Rate: Amount of Seed per 10 L Jug	Diseases Controlled:	Diseases Suppressed*:
Wheat	300 mL	3320 kg	Loose smut (*Ustilago tritici*), common bunt or stinking smut (*Tilletia tritici, T. laevis*); seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp.; seedling blight caused by seed-borne *Fusarium* spp.; damping-off caused by *Pythium* spp.; seed-borne *Septoria nodorum*.	Root and crown rot caused by seed- and soil-borne *Fusarium* spp.; common root rot caused by seed- and soil-borne *Cochliobolus sativus*; seed rot and pre-emergent damping-off caused by seed- and soil-borne *C. sativus*; seedling blight caused by seed-borne *C. sativus*.
Barley	300 mL	3320 kg	True loose smut (*Ustilago nuda*), covered smut (*U. hordei*), false loose smut (*U. nigra*); seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp.; seedling blight caused by seed-borne *Fusarium* spp.; damping-off caused by *Pythium* spp.; barley leaf stripe (*Pyrenophora graminis*).	
Oat	300 mL	3320 kg	Covered smut (*Ustilago kolleri*), loose smut (*U. avenae*); seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp.; seedling blight caused by seed-borne *Fusarium* spp.; damping-off caused by *Pythium* spp.	

* Suppression means consistent control at a level which is not optimal but is still of commercial benefit.

Application Information:

Raxil MD is a ready to use formulation designed for commercial or on-farm treatment with conventional seed treating equipment which can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to ensure seed safety and best disease control. See manufacturer's instructions supplied with the treater system for information on proper application technique.

Uniform coverage at the correct rate is important for satisfactory results. Under-treatment may lead to loss of efficacy and over-treatment could reduce germination. Seed may be planted immediately after treating.

How it Works:

The active ingredient tebuconazole is a systemic triazole fungicide with broad-spectrum activity. The active ingredient metalaxyl is an acylaline fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed.

Restrictions:

Resistance management: Refer to page 309.

Labelling: Treated seed must be labelled "This seed has been treated with Raxil MD Fungicide which contains tebuconazole and matalaxyl; DO NOT use for food, feed or oil processing."

Grazing: DO NOT graze or feed livestock on treated areas for 4 weeks after planting.

Re-cropping: No restrictions listed.

Storage: Store product in original container only, away from other pesticides, fertilizer, food or feed. Store in a cool, dry place and avoid excessive heat.

Environment: DO NOT contaminate water, food, or feed by storage, disposal, or by cleaning of equipment.

Hazard Rating:

(!) Danger – Skin and eye irritant

For an explanation of the symbols used here see page 11.

Raxil T

Fungicide Group – 3, M3
(Refer to page 311)

Company:

Bayer CropScience – PCP#27566

Formulation:

6.7 g per L tebuconazole plus 222 g per L thiram. Formulated as a flowable seed treatment.

Container size - 10L, 200L, 1000L.

Crops, Rates, and Diseases:

	USE RATE			
Crop:	**Rate per 100 kg of Seed**	**Amount of Seed per 10 L Jug**	**Diseases Controlled:**	**Diseases Suppressed*:**
Wheat	225 mL	4441 kg	Seed rot caused by seed- and soil-borne *Fusarium;* seedling blight caused by seed-borne *Fusarium;* seed rot and seedling blight caused by *Cochliobolus sativus;* seed rot caused by saprophytic fungi *Penicillium, Aspergillus* and *Alternaria;* seed-borne *Septoria;* common bunt (*Tilletia tritici, T. laevis*); loose smut (*Ustilago tritici*); *Pythium* seed rot	*Fusarium* root and crown rot; common root rot caused by *Cochliobolus sativus*
Barley	225 mL	4441 kg	Seed rot caused by seed- and soil-borne *Fusarium;* seedling blight caused by seed-borne *Fusarium;* seed rot and seedling blight caused by *Cochliobolus sativus;* seed rot caused by saprophytic fungi *Penicillium, Aspergillus* and *Alternaria;* false loose smut (*Ustilago nigra*); covered smut (*U. hordei*); loose smut (*U. nuda*); *Pythium* seed rot	*Fusarium* root and crown rot; common root rot caused by *Cochliobolus sativus*
Oats	225 mL	4441 kg	Seed rot caused by seed- and soil-borne *Fusarium;* seedling blight caused by seed-borne *Fusarium;* seed rot and seedling blight caused by *Cochliobolus sativus;* loose smut (*Ustilago avenae*); *Pythium* seed rot	Common root rot caused by *Cochliobolus sativus*

* Suppression means consistent control at a level which is not optimal but is still of commercial benefit.

Application Information:

Raxil T is a ready to use formulation designed for commercial or on-farm treating with conventional seed treating equipment which can accurately control application rates and provide good distribution of chemical. Uniform coverage at the correct rate is important for satisfactory results.

Germination will not be affected by treatment as long as over-application does not occur and seed is properly stored. Seed may be planted immediately after treating.

How it Works:

The active ingredient tebuconazole is a triazole fungicide with broad-spectrum activity. The active ingredient thiram is a dithiocarbomate fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Restrictions:

Resistance management: Refer to page 309.

Labelling: Treated seed must be labelled "This seed has been treated with *Raxil T* which contains the fungicides tebuconazole and thiram".

Grazing: DO NOT feed or graze livestock on treated areas for 4 weeks after planting.

Re-cropping: No restrictions listed.

Storage: Store product in original container, away from other pesticides, fertilizer, feed and food. Store in a cool, dry place and avoid excessive heat.

Environment: DO NOT contaminate water, food, or feed by storage, disposal, or by cleaning of equipment. Treated seed may be toxic to birds and other wildlife. Clean up any spilled seed.

Hazard Rating:

▽ Caution – Poison

▽ Caution – Skin irritant

For an explanation of the symbols used here see page 11.

Raxil WW

Fungicide Group – 3, 4
Insecticide Group – 4A
(Refer to page 311 and 441)

Company:

Bayer CropScience

Formulation:

Raxil WW has two components: ***Raxil MD*** (PCP#27692) 5.0 g per L tebuconazole and 6.6 g per L metalaxyl formulated as a flowable seed treatment and ***Stress Shield*** (PCP#29610) 480 g per L imidacloprid formulated as a suspension.

Crops, Diseases, Insects, and Rates:

Crops:	Diseases:	Insects:	**Rate of *Raxil MD* per 100 kg seed:**	**Rate of *Stress Shield* per 100 kg seed:**
Wheat (durum, spring, winter), Barley, Oats	For diseases controlled and/or suppressed, refer to *Raxil MD* (page 385).	Wireworm	300 ml	21 to 63 ml*

* Use the higher rate when infestation pressures are expected to be heavy. DO NOT apply any subsequent application of a Group 4 Insecticide (i.e. in-furrow or foliar application) following treatment with *Stress Shield.*

How it Works:

The active ingredient tebuconazole is a triazole fungicide with broad-spectrum systemic activity. The active ingredient metalaxyl is an acylaline fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 310. Imidacloprid is a chloronicotinyl insecticide with systemic activity. For more information refer to "Insecticide Groups Based on Modes of Action" on page 400.

Restrictions:

See *Raxil MD* (page 385) and consult individual labels for *Raxil MD* and *Stress Shield* for additional information regarding use restrictions.

Resistance management: Refer to page 309.

Labelling: All bags containing treated seed must be labelled or tagged as follows: "This seed has been treated with *Raxil WW* (*Raxil MD* and *Stress Shield*) seed protectant which contains tebuconazole and metalaxyl fungicides and imidacloprid insecticide. DO NOT use for feed, food or oil processing. Store away from feeds and other foodstuffs."

Grazing: DO NOT graze or feed livestock on treated areas for four weeks after planting.

Re-cropping: No restrictions listed.

Storage: Low temperature storage is not recommended. Prior to and during application, treatments must be thoroughly agitated to ensure uniform mixing of the product. Due to the viscosity of the material, it should be kept above 10 °C prior to and during application. DO NOT apply direct heat to container.

Environment: DO NOT contaminate water, food, or feed by storage, disposal, or by cleaning of equipment. Cover or incorporate spilled treated seeds. Left over treated seed should be double-sown around the headland, or buried away from water sources.

Hazard Rating:

(!) Danger – Skin and eye irritant

For an explanation of the symbols used here see page 11.

Senator PSPT

Fungicide Group – 1
(Refer to page 311)

Company:

Nippon Soda Company Ltd. – PCP#26236
Distributed by Engage Agro Corporation

Formulation:

10% thiophanate-methyl formulated as dust.
Container size - 10 kg.

Crops and Diseases:

Control of *Fusarium* rot, *Verticillium* wilt, silver scurf (*Helminthosporium solani*) of potato. Also aids in control of seed piece decay and blackleg infections of potato.

Rate:

Use 500 g per 100 kg cut seed (one 10 kg bag treats 2,000 kg seed).

Application Information:

Seed piece treatment. Apply in a convenient container or by dust attachment over belt. Cut pieces should be treated within 6 hours of cutting. For optimum control of silver scurf, ensure that seed tubers are completely free of soil. Total skin coverage is essential. If planting is to be delayed more than 1 to 2 days, the treated pieces should be stored for 2 to 3 days in open crates before bagging. This product contains no colourant; an appropriate colourant must be added when this product is applied.

How it Works:

The active ingredient thiophanate-methyl is a benzimidazole fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 310.

Restrictions:

Resistance management: Refer to page 309.

Labelling: No restrictions listed.

Grazing: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: Store product in a dry place. Avoid contamination of feed or food stuffs.

Environment: DO NOT contaminate domestic or irrigation water supplies, lakes, streams and ponds.

Hazard Rating:

None listed.

StorOx

Fungicide Group – U
(Refer to page 311)

Company:

Manufactured by BioSafe Systems Inc. – PCP#27432
Distributed in Western Canada by Brenntag Canada

Formulation:

27% hydrogen peroxide. Container size - 10 - 220 L.

Crops and Diseases:

Control of Fusarium tuber rot, bacterial soft rot and silver scurf in potato.

Rate and Application Information:

Prior to storage and in storage treatment for harvested potato tubers.

As a spray treatment for newly harvested potatoes before storage: 100 mL of *StorOx* per 10 L water. Spray diluted solution on tuber to runoff to achieve full and even coverage. Use 4.15 to 8.3 L water per tonne of potatoes.

As application to potatoes in storage as a direct injection into humidification water: 100 mL *StorOx* per 10 L water. Apply diluted product for at least 20 minutes per day, based on a humidification airflow rate of 0.6 cfm.

Registered Mixes:

May be used in conjunction with a growth inhibitor during humidification. Should not be combined or mixed with pesticides or fertilizer.

How it Works:

Hydrogen peroxide is an inorganic compound with contact activity against fungi and bacteria. For more information refer to "Fungicide Modes of Action" on page 310.

Restrictions:

Storage: Store in cool, well ventilated area away from direct sunlight. Since *StorOx* is a strong oxidizing agent, contact with combustibles may cause fire.

Environmental: DO NOT discharge effluent containing *StorOx* into lakes, streams, ponds or other bodies of water. DO NOT permit this product to enter surface or ground water.

Hazard Rating:

⯃ Danger – Corrosive to eyes

⚠ Warning – Skin irritant

Other Precautions: This product is corrosive to metal surfaces; rinse all application equipment thoroughly with water after use. Do not enter treated storage bins until the hydrogen peroxide air concentrations are below exposure levels established by occupational health and safety authorities.

For an explanation of the symbols used here see page 11.

Thiram 75WP

Fungicide Group – M3
(Refer to page 311)

Company:

Manufactured by Chemtura Canada Co.: *Thiram 75WP* – PCP#27556

Formulation:

Thiram 75WP: 75% thiram formulated as wettable powder. Container sizes - 5 kg, 25 kg.

Diseases Controlled:

Seed decay, seedling blight, damping off.

Crops and Rates:

Crop:	Rate per 100 kg Seed:	Amount of Seed one 5 Kg Package Treats:
Mustard, grasses, alfalfa	360 g	1,389 kg
Dry bean, pea, soybean	100 to 140 g	3,571 to 5,000 kg
Field corn	120 g	4,166 kg
Sweet corn	220 g	2,272 kg
Safflower	200 g	2,500 kg

Application Information:

To apply as slurry treatment, pre-mix *Thiram 75WP* in water (as indicated below) and apply through commercial seed treating equipment.

How it Works:

The active ingredient thiram is a dithiocarbamate fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Restrictions:

Resistance management: Refer to page 309.

Labelling: Treated seed should be labelled "DO NOT use for food or feed. This seed has been treated with thiram".

Grazing: DO NOT graze treated areas or feed clippings from treated areas to livestock.

Re-cropping: No restrictions listed.

Storage: Store in a cool, dry, ventilated place, away from feeds and foods. Keep away from flame, sparks and heat.

Environment: Treated seed may be harmful to birds if ingested. DO NOT contaminate any body of water.

Compatibility with rhizobia-based inoculants: *Thiram* is compatible with rhizobia, however, some restrictions may apply in storage length with *Thiram*-treated seed inoculated with rhizobia. Contact rhizobia manufacturer on use patterns with their rhizobia strain.

Hazard Rating:

☠ Warning – Poison

Other precautions: May irritate eyes, nose, throat and skin. May cause allergic eczema in sensitive individuals. Do not consume alcoholic beverages 24 hours before or after working with thiram.

For an explanation of the symbols used here see page 11.

Trilex AL

Fungicide Group – 11, 4
(Refer to page 311)

Company:

Bayer CropScience (PCP#29160)

Formulation:

13.5 g per L trifloxystrobin and 10.8 g per L metalaxyl formulated as a suspension concentrate.

Crops and Disease:

Protection of bean, chickpea, pea, lentil and soybean seed and seedlings from certain seed and soil-borne diseases caused by *Rhizoctonia solani, Fusarium* spp., and *Pythium* spp. Also protects from seed rot / pre-emergence damping-off, post-emergence damping-off, and seedling blight caused by *Botrytis cinerea* on lentil; and seed decay / pre-emergence damping-off caused by *Phomopsis longicolla* on soybean. It also provides suppression of seed-borne Ascochyta blight caused by *Ascochyta* spp on lentil, pea and chickpea.

Rate:

370 ml per 100 kg of seed.

Application Information:

The ready-to-use formulation is designed for commercial or on-farm treating with conventional seed treating equipment that can accurately control application rates and provide a good distribution of the chemical onto the seed in the mixing chamber. Uniform application on seed is necessary to ensure seed safety and best disease protection. If *Trilex AL* is diluted with water by greater than 10% by volume, ensure agitation of the mixture prior to application to seed.

How it Works:

Trifloxystrobin is a strobilurin fungicide with broad spectrum preventative activity. Metalaxyl is an acylalanine fungicide with systemic activity. For more information refer to "Fungicide Modes of Action" on page 310.

Restrictions:

Resistance management: Refer to page 309.

Labelling: All bags containing treated seed for sale or use in Canada must be labelled or tagged as follows: "This seed has been treated with *Trilex AL* containing trifloxystrobin and metalaxyl. Use chemical-resistant gloves when handling treated seed. Do not use for feed, food or oil processing. Store away from feeds and other foodstuffs."

Grazing: DO NOT graze or feed livestock on treated areas for 4 weeks after planting.

Storage: Store product in original container only, away from other pesticides, fertilizer, food or feed. Store in a cool, dry place and avoid excessive heat. Keep container closed.

Environment: Toxic to aquatic organisms. DO NOT discharge effluent containing this product into sewer systems, lakes, streams, ponds, estuaries, oceans or other waters. Dispose of all excess treated seed. Left over treated seed may be double-sown around the headland or buried away from water sources in accordance with local requirements. Residues of this product demonstrate the properties and characteristics associated with chemicals detected in groundwater. The use of this product may result in contamination of groundwater particularly in areas where soils are permeable (e.g., sandy soil) and/or depth to the water table is shallow.

Compatibility with rhizobia-based inoculants: *Trilex AL* is compatible with rhizobia-based inoculants. Check with inoculant manufacturers for further details prior to use.

Hazard Rating:

None listed.

Triticonazole

Fungicide Group – 3
(Refer to page 311)

Charter RTU / Armour RTU / Armour

Company:

BASF Canada (*Charter RTU* – PCP#29400)
Viterra (*Armour RTU* – PCP#30226, *Armour* – PCP#29296)

Formulation:

Charter RTU – 16.8 g per L triticonazole formulated as a liquid flowable seed treatment. Container size - 9.3 L and 200 L drums.

Armour RTU – 16.8 g per L triticonazole formulated as a liquid flowable seed treatment. Container size - 9.3 L.

Armour – 25 g per L triticonazole formulated as a liquid flowable seed treatment. Container size - 10 L (containing 6.2 L *Armour*).

Crops, Diseases and Rates:

Crop:	**Rate per 100 kg Seed:** *Charter RTU, Armour RTU*[1]	**Rate per 100 kg Seed:** *Armour*	**Diseases Controlled:**	**Diseases Suppressed[2]:**
Wheat	300 mL	200 mL	Seed rot caused by *Fusarium* spp.; seedling blight caused by seed-borne *Fusarium* spp.; loose smut (*Ustilago tritici*); common bunt (*Tilletia tritici, T. laevis*)	*Fusarium* crown and root rot; common root rot (caused by *Cochliobolus*); seedling blight caused by *Cochliobolus sativus*
Barley	300 mL	200 mL	Seed rot caused by *Fusarium* spp.; seedling blight caused by seed-borne *Fusarium* spp.; true loose smut (*Ustilago nuda*); covered smut (*U. hordei*); false loose smut (*U. nigra*)	
Oat	300 mL	200 mL	Seed rot caused by *Fusarium* spp.; seedling blight caused by seed-borne *Fusarium* spp.; loose smut (*Ustilago avenae*); covered smut (*U. kolleri*)	

[1] *Charter RTU* and *Armour RTU* are ready to use formulations. No water or dye is required to be added.

[2] Suppression means consistent control at a level which is not optimal but is still of commercial benefit.

Application Information:

Charter RTU and *Armour RTU* are ready to use seed treatment formulations and *Armour* is a concentrated seed treatment formulation. These products are for use in commercial seed plants, in on-farm standard gravity flow or mist type treatment machines, and in on-the-go air seeder treatment systems. Agitate or shake well prior to usage. Uneven seed coverage may result in poor levels of disease control. Seed should be well conditioned and cleaned before treating. Treated seed should not require drying after treatment.

***Charter RTU* and *Armour RTU* Water Volume:** *Charter RTU* and *Armour RTU* are ready to use formulations and no additional water is required. Consult the seed treatment application equipment manufacturer for specific application instructions for use of various seed treatment application machines.

***Armour* Water Volume:** Concentrate requires the addition of water. Mix 2 parts seed treatment with 1 part water. Consult the seed treatment application equipment manufacturer for specific application instructions for use of various seed treatment application machines.

How it Works:

The active ingredient triticonazole is a triazole fungicide that provides systemic broad spectrum protection against seed- and soil-borne diseases. For more information refer to "Fungicide Modes of Action" on page 310.

Restrictions:

Resistance management: Refer to page 309.

Labelling: Treated seed should be labelled "This seed has been treated with (*Charter RTU*, *Armour RTU*, or *Armour*) Seed Treatment Fungicide containing triticonazole, a Group 3 fungicide. DO NOT use for food, feed or oil processing". Store treated seed under cool, dry conditions.

Grazing: No restrictions listed.

Re-cropping: No restrictions listed.

Storage: Store product in the original container. Keep container closed. Any seed treated with this product must be either thoroughly stained with a conspicuous color or coated with a material that renders it conspicuous. DO NOT store treated seed for more than 18 months. Treated seed stored for more than 6 months should be tested for germination before use. Thoroughly clean auger after handling treated seed before using same auger for handling commercial or feed grains.

Environment: DO NOT feed treated seed to, or otherwise expose, wildlife or domestic birds. DO NOT contaminate domestic or irrigation water supplies, lakes, streams, ponds or any body of water with the chemical, used containers, treated seed or bags. DO NOT contaminate water by cleaning of equipment or disposal of wastes.

Hazard Rating:

Caution – Poison

For an explanation of the symbols used here see page 11.

Vibrance 500FS

Fungicide Group – 7
(Refer to page 311)

***Vibrance 500FS Seed Treatment* is currently only available as a co-pack (see *Cruiser Maxx Vibrance Beans, Helix Vibrance, Vibrance XL Co-Pack*).**

Company:

Syngenta Canada (PCP #30438)

Formulation:

500 g per L sedaxane formulated as a suspension.

Container size – 1L to 1050 L

Crops and Diseases:

Crop:	Diseases Controlled:
Barley	True loose smut caused by *Ustilago nuda;* seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*
Wheat	True loose smut caused by *Ustilago tritici;* seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*
Oats, rye, and triticale	Seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*
Canola and soybeans	Seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*

Rate:

5 to 10 mL product per 100 kg of seed. Use the low rate for control of pre-emergent damping-off, seedling decay, or seedling blight. Use the high rate for extended control of post-emergent damping-off and seedling blight or high disease pressure or high levels of seed-borne infections like smut.

Application Information:

Vibrance 500FS is for use on-farm and in closed transfer commercial seed treatment facilities. No open transfer is permitted for commercial seed treatment of barley, wheat, oats, rye and triticale. No on-farm seed treatment is permitted for canola and soybean.

Note: treatment of highly mechanically scarred or damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour.

This product contains no colourant. An appropriate colourant must be added when this product is applied to seed. Regulations pertaining to the "Seeds Act" must be strictly adhered to when using this product. Users are responsible for ensuring that the treated seed, when dried and ready for bagging, has an unnatural colour.

How it Works:

Sedaxane is a succinate dehydrogenase inhibitor fungicide with preventative and systemic activity that inhibits fungal metabolism by binding to the succinate dehydrogenase enzyme to disrupt cellular respiration and energy generation. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Small-grain cereals (Wheat, Barley, Oats, Rye, and Triticale): *Vibrance 500FS* may be mixed with *Dividend XL RTA Fungicide* or *Dividend Extreme Fungicide* for broad spectrum disease control of cereals. For protection from various insects, *Vibrance 500FS* may be mixed with *Cruiser 5FS* or *350FS Seed Treatment Insecticides* in commercial seed treatment facilities with closed transfer including closed mixing, loading, calibrating, and closed treatment equipment only. This tank-mix option is only valid for those crops common to the registered labels of both products. For combined protection from labeled insect pests and soil and seed-borne pathogens, *Vibrance 500FS* may be mixed with *Cruiser Maxx Cereals Seed Treatment* or *Cruiser Maxx Cereals Commercial Seed Treatment*. Consult each product label for registered use rates and follow all label use instructions. Read the label directions for each product and follow the most restrictive label precautions and limitations.

Canola: For additional disease control and protection from labeled insects, *Vibrance 500FS* may be mixed with *Helix XTra Seed Treatment* in commercial seed treatment facilities with closed transfer including closed mixing, loading, calibrating, and closed treatment equipment only. Consult each product label for registered use rates and follow all label use instructions. Read the label directions for each product and follow the most restrictive label precautions and limitations.

Soybeans: *Vibrance 500FS* may be mixed with *Apron Maxx RTA* or *Apron Maxx RFC Seed Treatments* and *Dynasty 100FS Fungicide* in commercial seed treatment facilities to control a broad spectrum of diseases. For protection from various insect pests, *Vibrance 500FS* may be mixed with *Cruiser 5FS* or *350FS Seed Treatment Insecticides* in commercial seed treatment facilities with closed transfer including closed mixing, loading, calibrating, and closed treatment equipment only. For combined protection from labeled insect and soil- and seed-borne pathogens, *Vibrance 500FS* may be mixed with *Cruiser Maxx Beans Seed Treatment* under the same "closed system" conditions as noted above. Consult each product label for registered use rates and follow all label use instructions. Read the label directions for each product and follow the most restrictive label precautions and limitations.

Restrictions:

Resistance management: Refer to page 309.

Labelling: All seed must be labelled "This seed has been treated with sedaxane fungicide. Wear long-sleeved shirt, long pants, and chemical-resistant gloves when handling treated seed. Do not graze or feed livestock on seeded area for 45 days after planting. Do not use for food, feed or oil processing. Store away from food and feed".

Grazing: DO NOT graze or feed livestock on treated areas for 45 days after planting.

Re-cropping: DO NOT plant any crop other than those on the product label within 60 days to fields in which seed treated with *Vibrance 500FS* seed treatment were planted.

Storage: Store away from food and feed.

Compatibility with *rhizobia*-based inoculants: *Vibrance 500FS* is compatible with Rhizobium based inoculants. Please check with inoculant manufactures for details prior to use. Note: Mixing with inoculants may increase drying time while treating extending the processing time.

Environment: Toxic to aquatic organisms. Do not contaminate food, feed, domestic or irrigation water supplies, lakes, streams and ponds. Treated seed is toxic to small wild animals. Any spilled or exposed seed must be incorporated into the soil or otherwise cleaned up from the soil surface.

Hazard Rating:

▽ Caution – Poison

For an explanation of the symbols used here see page 11.

Vibrance XL/ Vibrance XL Co-Pack

Fungicide Group – 3, 4, 7
(Refer to page 311)

***Vibrance XL Co-Pack* is a co-pack of *Dividend XL RTA* (difenoconazole and metalaxyl-M, page 400) and *Vibrance 500FS* (sedaxane, page 431). Information listed is limited to crop, diseases, insects and rates. For other detailed information on the component products see the product pages listed above.**

Company:

Syngenta Canada

Formulation:

Vibrance XL (PCP #30437): 66.2 g per L difenconazole, 16.5 g per L metalaxyl-M (and S-isomer), and 13.8 g per L sedaxane formulated as a suspension. Container size – 2 x 5.54 L

Vibrance XL Co-Pak has two components:

Dividend XL RTA (PCP#25777): 3.37% difenoconazole, 0.27% metalaxyl-M formulated as a flowable seed treatment. *Vibrance 500FS* (PCP#30438): 500 g per L sedaxane formulated as a suspension. See the component products for other information. Use the most stringent restrictions for either product. Container size – 115 L *Dividend XL RTA* + 1.77L *Vibrance 500FS* or 450 L *Dividend XL RTA* + 4x1.77 L *Vibrance 500FS*

Crops and Diseases:

Crop:	Diseases Controlled:	Diseases Suppressed[2]
Barley	General seed rots[1]; seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* or *Rhizoctonia* spp or soil-borne *Pythium*; seed-borne *Septoria*[2]; covered smut (*Ustilago hordei*), false loose smut (*U. nigra*), and true loose smut (*U. nuda*).	Common root rot (caused by *Cochliobolus* spp.); *Fusarium* crown and foot rot; take-all (*Gauemannomyces graminis var. tritici*)
Winter Wheat and Spring Wheat	General seed rots[1]; seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* or *Rhizoctonia* spp or soil-borne *Pythium*; loose smut (*Ustilago tritici*), seed-borne and soil-borne common bunt (*Tilletia tritici*, *T. laevis*).	
Winter Wheat only	Dwarf bunt (*Tilletia controversa*); seed-borne *Septoria* and early season foliar disease control of *Septoria* leaf blotch for first 4 weeks after planting (for full season control apply a foliar fungicide according to label directions).	
Rye	General seed rots[1]; seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* or *Rhizoctonia* spp or soil-borne *Pythium*; seed-borne *Septoria*[2]; seed-borne and soil-borne common bunt (*Tilletia caries*) and dwarf bunt (*T. controversa*).	
Triticale	General seed rots[1]; seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* or *Rhizoctonia* spp or soil-borne *Pythium*; loose smut (*Ustilago tritici*).	Common root rot (*Cochliobolus* spp.)
Oats	General seed rots[1]; seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* or *Rhizoctonia* spp or soil-borne *Pythium*; covered smut (*Ustilago kolleri*) and loose smut (*U. avenae*)	

[1] General seed rots controlled include those caused by saprophytic organisms such as *Fusarium*, *Pythium*, *Penicillium* and *Aspergillus*.

[2] Suppression means consistent control at a level which is not optimal but is still of commercial benefit.

Rate:

Vibrance XL: 180 to 360 mL product per 100 kg of seed. Use the high rate if there is a history of high disease pressure in the field, when field conditions favour seed-borne and soil-borne pathogens, when planting seed with high levels of seed-borne infections like smut, for extended control of post-emergent damping-off, or when controlling seed-borne *Septoria* or early season *Septoria* leaf blotch.

Application Information:

Vibrance XL is for use on-farm and commercial seed treatment facilities. No open transfer is permitted for commercial seed treatment of barley, wheat, oats, rye and triticale.

Note: treatment of highly mechanically scarred or damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour.

This product contains a pigment that will adequately colour treated seed. However, ensure that treated seed has an unnatural colour after treatment, when dried and ready for bagging. Regulations pertaining to the *Seeds Act* must be strictly adhered to when using this product. An appropriate colourant must be added when this product if the pigment does not colour the seed adequately.

How it Works:

Sedaxane is a succinate dehydrogenase inhibitor fungicide with preventative and systemic activity that inhibits fungal metabolism by binding to the succinate dehydrogenase enzyme to disrupt cellular respiration and energy generation. The active ingredient difenoconazole is a triazole fungicide with broad-spectrum, systemic activity. Metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes class, including Pythium damping-off. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

Small-grain cereals (Wheat, Barley, Oats, Rye, and Triticale): *Vibrance 500FS* may be mixed with *Dividend XL RTA Fungicide* or *Dividend Extreme Fungicide* for broad spectrum disease control of cereals. For protection from various insects, *Vibrance 500FS* may be mixed with *Cruiser 5FS* or *350FS Seed Treatment Insecticides* in commercial seed treatment facilities with closed transfer including closed mixing, loading, calibrating, and closed treatment equipment only. This tank-mix option is only valid for those crops common to the registered labels of both products. For combined protection from labeled insect pests and soil and seed-borne pathogens, *Vibrance 500FS* may be mixed with *Cruiser Maxx Cereals Seed Treatment* or *Cruiser Maxx Cereals Commercial Seed Treatment*. Consult each product label for registered use rates and follow all label use instructions. Read the label directions for each product and follow the most restrictive label precautions and limitations.

Canola: For additional disease control and protection from labeled insects, *Vibrance 500FS* may be mixed with *Helix XTra Seed Treatment* in commercial seed treatment facilities with closed transfer including closed mixing, loading, calibrating, and closed treatment equipment only. Consult each product label for registered use rates and follow all label use instructions. Read the label directions for each product and follow the most restrictive label precautions and limitations.

Soybeans: *Vibrance 500FS* may be mixed with *Apron Maxx RTA* or *Apron Maxx RFC Seed Treatments* and *Dynasty 100FS Fungicide* in commercial seed treatment facilities to control a broad spectrum of diseases. For protection from various insect pests, *Vibrance 500FS* may be mixed with *Cruiser 5FS* or *350FS Seed Treatment Insecticides* in commercial seed treatment facilities with closed transfer including closed mixing, loading, calibrating, and closed treatment equipment only. For combined protection from labeled insect and soil- and seed-borne pathogens, *Vibrance 500FS* may be mixed with *Cruiser Maxx Beans Seed Treatment* under the same "closed system" conditions as noted above. Consult each product label for registered use rates and follow all label use instructions. Read the label directions for each product and follow the most restrictive label precautions and limitations.

Restrictions:

Resistance management: Refer to page 309. Experience has shown that strains of fungus resistant to metalaxyl-M (and S-isomer) may develop. Failure to control the disease will result in crop damage and/or yield losses. If disease appears in a treated field, consult the government extension specialist immediately.

Labelling: All seed must be labelled "This seed has been treated with difenconazole, metalaxyl-M (and S-isomer), and sedaxane fungicides. Wear long-sleeved shirt, long pants, and chemical-resistant gloves when handling treated seed. Do not graze or feed livestock on seeded area for 45 days after planting. Do not use for food, feed or oil processing. Store away from food and feed".

Grazing: DO NOT graze or feed livestock on treated areas for 45 days after planting.

Re-cropping: DO NOT plant any crop other than those on the product label within 60 days to fields in which seed treated with *Vibrance XL* were planted.

Storage: Store away from food and feed. Ideal storage is above freezing and below 30C.

Environment: Toxic to aquatic organisms. Do not contaminate food, feed, domestic or irrigation water supplies, lakes, streams and ponds. Treated seed is toxic to small wild animals. Any spilled or exposed seed must be incorporated into the soil or otherwise cleaned up from the soil surface.

Hazard Rating:

Caution – Poison

For an explanation of the symbols used here see page 11.

Vitaflo Brands

Fungicide Group – 7, M3
(Refer to page 311)

Company:

Manufactured by Chemtura Canada Co (*Vitaflo 280* PCP#11423; *Vitaflo 220* PCP#21174)

Manufactured by Interprovincial Cooperative Limited (*Vitaflo SP Fungicide* PCP#30381)

Manufactured for Viterra Inc. by Interprovincial Cooperative Limited (*Vitaflo Fungicide* PCP#30380)

Formulation:

Vitaflo 280/Vitaflo Fungicide/Vitaflo SP Fungicide: : 15.59% carbathiin and 13.25% thiram formulated as a liquid suspension.
Container sizes - 10 L, 55L, 100 L, 200 L, 1000 L.
Vitaflo 220: 220 g/L carbathiin and 200 g/L thiram formulated as a liquid suspension. Container size - 10 L.

Crops, Diseases and Rates:

Crop:	*Vitaflo 280/ Vitaflo Fungicide/ Vitaflo SP Fungicide* Rate per 100 kg Seed:	*Vitaflo 220* Rate per 100 kg Seed:	Diseases Controlled:	Diseases Suppressed[4]:
Barley	230 to 330[1] mL	250 mL	False loose smut (*Ustilago nigra*); true loose smut (*U. nuda*); covered smut (*U. hordei*); leaf stripe (*Pyrenophora graminea*); seed rot and seedling blight caused by *Pythium* spp., *Penicillium* spp., *Fusarium* spp. and *Cochliobolus sativus*. Seed rot due to storage fungi *Aspergillus* and *Alternaria* spp.	Suppression of root rot caused by *Cochliobolus sativus* and *Fusarium* spp.; suppression of net blotch (*Pyrenophora teres*)
Wheat	230 to 330[1] mL	250 mL	Loose smut (*Ustilago tritici*); common bunt (*Tilletia tritici, T. laevis*); seed-borne dwarf bunt (*T. controversa*); seed-borne *Septoria*; seed rot and seedling blight caused by *Cochliobolus sativus, Fusarium, Pythium, Aspergillus, Penicillium* and *Alternaria* spp. Seed rot due to storage fungi *Aspergillus* and *Alternaria* spp.	Suppression of root rot caused by *Cochliobolus sativus* and *Fusarium* spp.
Oat	330 mL	250 mL	Loose smut(*Ustilago avenae*); covered smut (*U. kolleri*); seed rot seedling blight caused by *Fusarium, Pythium, Penicillium*. Seed rot due to storage fungi *Aspergillus* and *Alternaria* spp.	Suppression of root rot caused by *Cochliobolus sativus*
Rye	230 to 330[1] mL	250 mL	Stem smut (*Urocystis occulta*); damping off; seed rot and seedling blight caused by *Fusarium, Pythium, Penicillium* and *Cochliobolus sativus*. Seed rot due to storage fungi *Aspergillus* and *Alternaria* spp.	Suppression of root rot caused by *Cochliobolus sativus* and *Fusarium* spp.
Triticale	200 mL	–	Seed rot, damping off and seedling blight caused by *Fusarium, Pythium, Penicillium*, and *Cochliobolus sativus*.	–
Dry bean	260 mL	195 mL	Early season seed rot, seedling blight, and root rot caused by *Rhizoctonia solani*; Seed-borne anthracnose (*Colletotrichum lindemuthianum*). Will not protect from wind borne spores. This product will not control anthracnose if seed is severely infected.	–

See footnotes on following page.

Continued...

Crops, Diseases and Rates *continued*:

Crop:	*Vitaflo 280/ Vitaflo Fungicide/ Vitaflo SP Fungicide* Rate per 100 kg Seed:	*Vitaflo 220* Rate per 100 kg Seed:	Diseases Controlled:	Diseases Suppressed[4]:
Corn (Field & Sweet)	280 560 to 748[2] mL	210 420 to 565 mL	Seed rot and damping off caused by *Fusarium, Pythium*, and *Penicillium* spp. and seed-borne head smut (*Sporisorium holci-sorghi*). Will not control soil-borne head smut.	–
Flax	525 mL	395 mL	Seed rot, root rot and seedling blight caused by *Rhizoctonia solani* and *Fusarium* spp. DO NOT use slurry treatment for flax, use dilution, according to *Vitaflo220* Operating Manual, available from dealers.	–
Lentil	330 mL	–	Seed rot, seedling blight, and early season root rot caused by *Botrytis cinerea, Rhizoctonia solani, Fusarium* and *Pythium* spp.	–
Pea	260 to 330[3] mL	–	Seed rot and seedling blight caused by *Ascochyta (Mycosphaerella), Rhizoctonia solani, Fusarium* and *Pythium* spp.	–
Soybean	260 mL	195 mL	Seed rot and seedling blight caused by *Rhizoctonia solani, Phomopsis* and *Fusarium* spp.	–

[1] The low rate will give partial control of true loose smut in wheat/barley and stem smut in rye. Use the high rate for septoria, seed rot and seedling blight, and suppression of root rot. Also use the high rate (330 mL per 100 kg) for dwarf bunt control in winter wheat.

[2] Use 560-750 mL per 100 kg seed to control head smut of corn.

[3] Use high rate (330 mL per 100 kg) on pea seed to control ascochyta (*Mycosphaerella pinodes*).

[4] Suppression means consistent control at a level which is not optimal but is still of economic benefit.

Application Information:

Designed to be used undi-luted in commercial seed treaters. Undiluted product can be used at temperatures down to -20ºC. Centrifugal pumps are not recommended for pumping product. Use of a *Vitaflo* Pump is recommended. If containers have been in storage, some settling may occur and require agitation.

How it Works:

The active ingredient carbathiin is a carboximide fungicide with systemic activity and the active ingredient thiram is a dithiocarbamate fungicide with contact activity. For more information refer to "Fungicide Modes of Action" on page 310.

Tank Mixes:

None listed.

Restrictions:

Resistance managment: Refer to page 309.

Labelling: Treated seed must be labelled as follows "This seed has been treated with *Vitaflo 280, Vitaflo 220, Vitaflo Fungicide*, or *Vitaflo SP Fungicide* liquid seed protectant containing carbathiin and thiram. Do not use for feed, food, or oil processing."

Grazing: DO NOT graze or feed livestock on treated area for four weeks after planting except for the following crops: Soybean - DO NOT graze or feed livestock on forage and hay on treated areas; Bean - DO NOT graze or feed on bean forage for 60 days; Barley, oat, wheat - DO NOT graze or feed on treated area for 6 weeks.

Re-cropping: No restrictions listed.

Storage: DO NOT store product in direct sunlight or above 35°C. Will not freeze even at extreme tempera- tures. If containers have been stored for several months, shake well before using. DO NOT store dry beans, peas, lentils, or soybeans treated with *Vitaflo 280/Vitaflo Fungicide/Vitaflo SP Fungicide*. Wheat, barley, rye, oats, triticale and flax seed treated with *Vitaflo 280/Vitaflo Fungicide/Vitaflo SP Fungicide* can be stored up to 18 months without reduction in germination. Corn seed treated with *Vitaflo 280/Vitaflo Fungicide/ Vitaflo SP Fungicide* can be stored up to one year without reduction in germination.

Environment: DO NOT contaminate ponds, lakes or streams.

Compatibility with rhizobia-based inoculants: *Vitaflo 280, Vitaflo 220, Vitaflo Fungicide*, and *Vitaflo SP Fungicide* are compatible with rhizobia. Do not tank mix *Vitaflo 280, Vitaflo Fungicide*, or *Vitaflo SP Fungicide* and rhizobia. Always check with rhizobia manufacturers on any restrictions that may exist with seed treatments.

Hazard Rating:

◇ Warning – Eye Irritant

▽ Caution – Skin Irritant

For an explanation of the symbols used here see page 11.

Insect Control

Additional Resources

For additional information on monitoring, economic thresholds and biological control of insects in field crops, as well as information on insect management in commodities other than those covered in this guide see the WCCP Guide to Integrated Control of Plant Pests at:
http://www.westernforum.org/wccp%20guidelines.html

Insect Management Decisions

Crop rotations, cultivar selections, and seeding dates can be chosen to reduce the risk of injury from some insects that may be of higher risk to a crop. Management of insects with insecticides should only be considered when numbers or damage exceed economic thresholds. To select an insecticide, verify the registered products for the insect and field crop in the following tables. Consideration should then be given to the preharvest intervals, how the product will be applied, restrictions, precautions and the hazard rating.

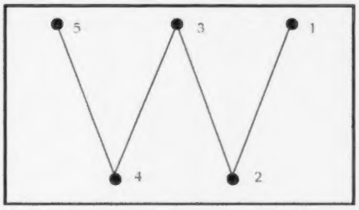
Preharvest Interval

The **preharvest interval** is the number of days that must pass between the last application of a pesticide and harvest. Harvest is the cutting of the crop or removal of the produce from the plant. It includes direct-combining, cutting (swathing) or grazing; it does not include swath-combining or baling for hay.

Field Scouting

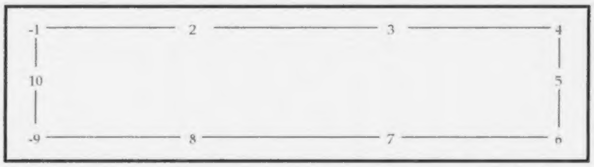
Field scouting is the regular examination of fields to accurately assess the kind and the number of insects, plant pathogens and weeds present and the amount of damage being done. Scouting should be done weekly during the growing season and more frequently when infestations approach economic levels or when weather conditions favour the rapid development of specific pests.

To properly scout for insect pests, you must know when they occur, where they live, what they look like, and how to find and count them. The number of locations to assess in a field will depend on the field size, and any specific pests that may be of concern. Generally a minimum of 5 sites should be sampled, however some insects may require more sites to be sampled to accurately make management decisions. There are several possible scouting patterns that can be used when checking fields. These options are based on pest distribution and field configuration.



Pattern 1: Used when pests are uniformly distributed.

This scouting pattern typically looks like an X, Z or W, excluding field edges. Pests that fit this pattern include aphids, bertha armyworm and diamondback moth.



Pattern 2: Used when pests are at the edges of fields.

Scout by walking along field edges, fence lines or ditches. Some examples of when you would include more focused scouting along field edges are to estimate early-season populations of flea beetles, Colorado potato beetles and grasshoppers.

In each area examined, use of a sweep net, if possible, is a good way to determine what potential pests and beneficial insects may be present. This should be followed by examining some plants and the soil surface. More specific counts of a particular type of insect or plant damage may be necessary if they are abundant during the more general scouting.

Economic Thresholds

Monitoring methods, typical symptoms and economic thresholds or nominal thresholds for the more common crop pests are described in the field scouting section for each commodity. The density of the insects that causes damage equal to the cost of preventing the damage is called the **economic injury level**. The **economic threshold** is the density of insects at which control measures should be applied to prevent an increasing population from reaching the economic injury level. Note that factors such as moisture, temperature conditions and stage of crop growth, can increase or decrease the impact of insects on crop production. In some instances, **nominal thresholds** are presented; these decision guidelines are based on experience rather than research quantifying the impact of the insects on the crop.

Estimating Percent Defoliation

Many economic thresholds for insects are based on percent defoliation of the plants they are feeding on. The following figure may assist in determining the percent defoliation. Although the photo below is of sunflower leaves, this figure can be used to estimate % defoliation for many crops.

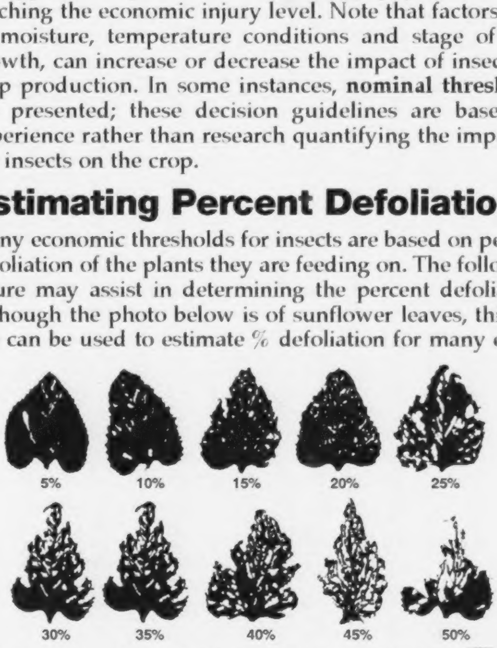


Photo courtesy of North Dakota State University Extension Service

Field Hazard of Insecticides to Bees

The following table indicates the maximum time required for the insecticides listed in the Guide to be degraded by weather to a low hazard level for bees. **These times are to be used as general guidelines only.** Most of these insecticides have not been tested for bee toxicity under Western Canadian conditions and environmental conditions influence the rate at which pesticides degrade.

	HAZARD RATING[a]		
INSECTICIDE	HONEY BEE	LEAFCUTTER BEE	RESIDUE HAZARD (DAYS)[b]
Admire/Alias/ Grapple	1	1-2	<1 - >1
Assail	1-2	-	<1
Beleaf	3	-	<1
Cygon/Lagon	1	1	3 - 7
Coragen	3	-	-
Decis	1-2	1-2	<1 - 1
Delegate	1-2	1	-
Diazinon	1	1	1-7
Dibrom	1-2	1-2	<1-4.5
Dipel	3	3	none
Eco bran	3	3	N/A
Fulfill	2-3	2	<1
Furadan	1	1	3-14
Lannate	1-2	1-2	<1 - 1.5
Lorsban/Pyrinex/Nufos/Citadel	1	1	2-6
Malathion	1-2	1	2 (Honey Bee), 6 (Leafcutter Bee)
Matador/Silencer	1	1	>1
Monitor	1	1	1
Movento	1	-	-
Oberon	1-2	1	-
Orthene	1	1	2.5 - 3
Pounce/Perm-UP	1	1	<1 - 5
Rimon	1-2	2	1
Ripcord/UP-Cyde	1	1	<1 - >3
Sevin	1-2	1-2	<1 - 7
Success / Entrust	1-2	1	<1 - >1
Thiodan/Thionex	1-2	1	<1 - 3

[a] **HAZARD RATING** 1 = Very poisonous to bees; do not apply to crops or weeds in bloom unless bees are kept off for the period that residue on the crop is a hazard. 2 = Moderately poisonous to bees; avoid direct application to bees, but may be applied with minimum hazard in late evening when bees are not foraging. 3 = Not very poisonous to bees; may be applied with minimum hazard to bees.

[b] Residue hazard represents the average time in days that residues poisonous to honey bees will remain on foliage (may vary with formulation and weather). Unusually low temperatures following spray application may cause residues to remain toxic longer than under warmer conditions. Morning dew can also make residues more toxic to foraging bees.

A more extensive list of hazard ratings of insecticides to bees and duration of toxicity can be found at the Western Committee on Crop Pests website at: http://www.westernforum.org/WCCP%20Guidelines.html

Reducing Bee Losses from Insecticides

Careless use of insecticides can kill bees and other beneficial insects such as pollinators, predatory and parasitic biological control insects. Help to reduce insecticide poisoning of bees by:

1. **Avoid applying insecticides that are toxic to bees on crops in bloom.** Any field with even a small amount of bloom, whether it is the main crop, cover crop, or weeds will probably have foraging bees visiting the flowers. If at all possible, apply insecticides before or after the crop has gone into bloom. Control all flowering weeds prior to insecticide application.
2. **Apply insecticides when bees are least active.** The highest level of bee activity occurs during the day. Apply insecticides in late evening or early morning when the bees are not foraging. As a general rule, evening applications are less hazardous to bees than morning applications.
3. **Avoid insecticide drift.** To avoid insecticides drifting into non-target locations, do not apply insecticides during windy conditions. Choose nozzles with a low drift rating. As a general rule, ground applications of insecticide are less prone to drift than aerial applications.
4. **Contact the beekeeper before spraying.** Communication and cooperation between the insecticide applicator and the beekeeper can usually prevent bee losses. Notifying the beekeeper in advance (i.e. 48 hours) of applying insecticides will allow the beekeeper to move or protect the colonies from insecticide damage.
5. **If possible, use insecticides and/or insecticide formulations which are the least hazardous to bees.** The following table "Field Hazard of Insecticides to Bees" will help in selecting the least hazardous insecticide. In general, dusts are more hazardous to bees than sprays. Wettable powders are more hazardous than emulsifiable concentrates (EC) or water-soluble formulations. Granular insecticides and spreadable bran bait insecticides are generally the least hazardous to bees.

Insecticide Poisoning in Humans

Organophosphate (OP) and carbamate insecticides (identified on the Insecticide Groups chart page 441) can pose a more serious risk to unprotected persons. Poisonings can occur while mixing, loading and/or during the application of these products without the appropriate protective equipment or measures. These pesticides are readily absorbed through the skin or the lungs, and can act as nervous system toxins. Overexposure can produce symptoms such as headache, nausea, pupil dilation and excessive sweating and salivation. Higher doses may cause breathing difficulties, muscle twitching, weakness and spasms. Very high doses have caused respiratory failure and death.

Both OP and carbamate pesticides inhibit an enzyme called cholinesterase. Measurements of cholinesterase in the blood before and during the application season can indicate harmful exposures to OPs and carbamates. **Persons who intend to mix, load and/or apply these types of pesticides repeatedly during a season, need a baseline and repeat measurements. Consult your doctor before the spraying season to arrange for these measurements.** For more information, see ***Monitoring Exposure to Organophosphorus and/or Carbamate Insecticides***, a joint publication of Saskatchewan Labour and Saskatchewan Health. This publication can be viewed on the SK Labour web site: www.lrws.gov.sk.ca.

Degree of Risk and Hazard Rating:

(see page 11 for full description)

Resistance of Insects to Insecticides

Repeated use of the same insecticide, or insecticides with the same mode of action, against a particular insect in a given area may result in the effectiveness of the insecticide being reduced.

To delay or prevent resistance of insects to insecticides:

1. Integrate different control methods (cultural, biological, chemical) into insect control programs whenever possible.
2. Use insecticides only when the economic threshold for a pest has been surpassed and natural controls fail to limit economic damage, and
3. Rotate between insecticides with different modes of action, particularly if several applications are made in a season.
4. Keep accurate records of insecticides used for each of your fields.

Insecticides can be classified according to their similarity in chemical structure (chemical group in the table below), and by mode of action (the process by which the insecticide kills the insect). The "Group" column in the following table separates insecticides based on their mode of action. By selecting products with different modes of action for an insecticide rotation program, risk of insecticide resistance can be reduced.

Insecticide Groups Based on Modes of Action

GROUP	CHEMICAL GROUP	TRADE NAME	ACTIVE INGREDIENT	MODE OF ENTRY
1A	Carbamates	Sevin Eco Bran	carbaryl	contact/ ingestion (Sevin) ingestion (Eco Bran)
		Lannate	methomyl	contact/ ingestion
		Vydate	oxamyl	contact/ ingestion
		Furadan	carbofuran	contact/ ingestion
1B	Organophosphates	Malathion	malathion	contact
		Diazinon, Agrox B-2, Agrox CD	diazinon	contact/ ingestion
		Orthene	acephate	contact/ ingestion
		Dibrom	naled	contact/ ingestion
		Imidan	phosmet	
		Lorsban, Pyrinex, Nufos, Citadel, Pyrifos	chlorpyrifos	contact/ ingestion/ inhalation ingestion
		Lagon, Cygon 480 EC, Cygon 480-AG	dimethoate	contact/ ingestion
		Thimet	phorate	ingestion
		Monitor	methamidophos	contact/ ingestion
2A	Cyclodiene organochlorines	Thiodan, Thionex	endosulfan	contact/ ingestion
3A	Pyrethroids	Decis	deltamethrin	contact/ ingestion
		Ripcord, UP-Cyde	cypermethrin	contact/ ingestion
		Matador, Silencer	lambda-cyhalothrin	contact/ ingestion
		Ambush, Pounce, Perm-UP	permethrin	contact/ ingestion
		Tempo	cyfluthrin	
4A	Neonicotinoids	Helix, Cruiser Actara 240SC Actara 25WG	thiamethoxam	ingestion ingestion contact/ ingestion
		Admire, Alias, Grapple, Grapple$_2$, Gaucho, Sombrero	imidacloprid	contact/ ingestion (flowable formulations) ingestion (seed treatments)
		Assail	acetamiprid	contact/ ingestion
		Prosper, Poncho, Titan, Clutch	clothianidin	ingestion
5	Spinosyns	Success, Entrust	spinosad	contact/ ingestion
		Delegate	spinetoram	contact/ ingestion
9B	Selective homopteran feeding blockers	Fulfill	pymetrozine	ingestion mainly, some contact activity
9C		Beleaf	flonicamid	contact/ ingestion
11	Microbial disruptors of insect midgut membranes	Dipel	*Bacillus thuringiensis var. Kurstaki*	ingestion
15	Benzoylureas	Rimon 10 EC	novaluron	ingestion/ contact
23	Tetronic and tetramic acid derivatives	Movento	spirotetramat	
		Oberon	spiromesifen	contact
24A		Phostoxin	aluminum phosphide	inhalation (fumigant)
28	Diamides	Coragen	chlorantraniliprole	ingestion/ contact

A more detailed table showing insecticides organized by mode (site) of action, and specific information on the mode (site) of action for the different groups can be found in Appendix III of PMRA Regulatory Directive DIR99-06 found at: http://www.hc-sc.gc.ca/pmra-arla/english/pdf/dir/dir9906-e.pdf

Field Scouting in Alfalfa

SAP OR FLUID FEEDERS

Lygus bugs/Alfalfa plant bug

Typical Damage: Field blooms poorly or not at all. Flower buds blasted, whitish, and dry; flowers dropping off before fully open. Collapsed seed.

When and How to Monitor: Look for plant bugs when monitoring alfalfa in June through mid-August. Make five 180° sweeps with a 15-inch (40 cm) insect net through alfalfa canopy at each sampling site. Record total number of plant and lygus bugs (both nymphs and adults) captured. Calculate average number per sweep.

Economic Threshold: Hay: Control not recommended. Seed alfalfa at bud and early bloom: 8 lygus bugs/sweep; 4 alfalfa plant bugs/sweep; or 5 bugs if the plant bug population is a combination of lygus bugs and alfalfa plant bug. If insecticides are used, attempt to spray before the onset of bloom. Protecting insect pollinators in seed production fields is very important.

Potato Leafhopper

Leafhoppers are most severe in new seedings and in regrowth under hot dry weather.

When and How to Monitor: Take 20 180° sweeps from 5 areas of the field. Avoid field edges. Determine the average number of potato leafhoppers per sweep.

Economic Threshold: For 9cm stem height = 0.2 adult leafhoppers per sweep; 15 cm stem height = 0.5 adults per sweep; 25 cm stem height = 1 adult or nymph per sweep; 36 cm stem height = 2 adults or nymphs per sweep.

Pea Aphid

Typical Damage: Suck juices from plants; stunt growth; cause premature drying.

When and How to Monitor: Look for when monitoring in July through August. Take 5 sweeps at each location. Monitor fields closely during periods of slow plant growth.

Economic Threshold: 100-200 aphids/180°sweep when crop is moisture stressed, or until mid-August.

DEFOLIATORS

Alfalfa Weevil

Typical Damage: Feed on developing buds and leaves. Stunt growth.

When and How to Monitor: Start scouting fields in mid-May. Look for shot holes initially, then clipping along the edges of leaves and pinhole damage. For determining if levels are at threshold in hay crops, collect 30 stems in an M-shaped pattern, place them inside a white pail and beat them against the side to knock off larvae. Do not include younger first and second instar larvae (3 mm or less) in the counts. Determine the average height of the crop as well.

Economic Threshold: Alfalfa Hay: One of the best control strategies is to cut fields for hay early. If early cutting of the hay crop is not possible, treatment thresholds are based on the following measurements of plant height and levels of larvae: <30 cm – 1 larva/stem; <40 cm – 2 larvae/stem; 3 larvae per stem requires immediate action regardless of height of crop. On regrowth for second crop, 2 or more active larvae per crown (4 to 8 larvae/ft^2) will require insecticide application.

Alfalfa Seed: 20 to 30 3rd or 4th instar larvae/sweep (90°=straight sweep) or 35 to 50% of foliage tips showing damage. In some instances it may be practical to just treat hotspots and not entire fields.

Alfalfa Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[2]
Sap or Fluid Feeders					
Lygus bugs	Rimon 10EC (seed production only) (SB)	0.338 L	14	G	>5,000
	Assail (seed production only) (N)	35-69 g	1	G	1,064
	Matador /Silencer (P)	34 ml	Do not apply within 3 days of livestock foraging.	A or G (Matador) G (Silencer)	64-110
	Decis 5EC (seed production only) (P)	80-100 ml	20	G	395
	Malathion 500 (OP)	0.80-1.21 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Dibrom (OP)	0.44-0.88	4	A or G	345

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[2]
Lygus bugs *continued*	Cygon 480 EC / Cygon 480-AG (OP) (seed and forage production)	0.17 L	2	A or G	60-450
	Lagon / Cygon 480 EC / Cygon 480-AG (OP) (seed production only)	0.44 L	28	A or G	60-450
Alfalfa plant bug	Assail (seed production only) (N)	35-69 g	1	G	1,064
	Cygon 480 EC (OP) (seed and forage production)	0.17 L	2	A or G	60-450
	Lagon / Cygon 480 EC / Cygon 480-AG (OP) (seed production only)	0.44 L	28	A or G	60-450
Potato leafhopper	Matador / Silencer (P)	34 ml	Do not apply within 3 days of livestock foraging.	A or G (Matador) G (Silencer)	64-110
	Sevin XLR Plus (C)	1.01-1.6 L	2	A or G	649
	Malathion 500 (OP)	0.80-1.21 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Dibrom (OP)	0.44-0.88 L	4	A or G	345
	Lagon / Cygon 480 EC / Cygon 480-AG (OP)	0.17 L	2	A or G	60-450
Spittlebugs	Malathion 85E (OP) (adults)	0.445 – 0.544 L	7	A or G	5,500
	Thiodan (OC)	0.3 L	30	G	107.2
Pea Aphid	Beleaf (seed production only) (HFB)	49 – 65 g		G	
	Matador / Silencer (P)	34 ml	Do not apply within 3 days of livestock foraging.	A or G Matador) G (Silencer)	64-110
	Malathion 500 (OP)	0.80-1.21 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Dibrom (OP)	0.44-0.88 L	4	A or G	345
	Lagon / Cygon 480 EC / Cygon 480-AG (OP)	0.17 L	2	A or G	60-450
Spider mites	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Oberon	0.202 – 0.405 L		A or G	>2,000
			Defoliators		
Grasshoppers	**Spreadable Bran Baits**				
	Nolo Bait (M)	Minimum of 0.45 kg		A or G	
	Eco bran (C)	0.8-1.6 kg	2	G	N/A
	Sprays				
	Matador / Silencer (P)	25-34 ml (Ground) 34 ml (Aerial)	Do not apply within 3 days of livestock foraging.	A or G	64-110

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[2]
Grasshoppers *continued*	Sevin XLR Plus (C)	0.50-1.01 L	2	A or G	649
	Malathion 500 (OP)	0.80-1.21 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Lagon / Cygon 480 EC / Cygon 480-AG (OP)	0.22 L (nymphs) 0.34-0.36 L (adults)	2-7 (Lagon, Cygon 480 EC) 28 (Cygon 480-AG)	A or G	60-450
Alfalfa weevil	If alfalfa has reached the bud or early bloom stage, immediate **cutting** will kill many alfalfa weevil larvae				
	Coragen (D) (suppression only)	152-202 ml	0	G	>5,000
	Matador / Silencer (P)	34 ml	Do not apply within 3 days of livestock foraging.	A or G (Matador) G (Silencer)	64-110
	Decis 5EC (seed crops only) (P)	80 – 100 ml	20	G	395
	Malathion 500 (OP)	0.80-1.21 L	7	A or G	4302
	Malathion 85E (larvae only) (OP)	0.445-0.544 L	7	A or G	5,500
	Imidan (OP)	0.91 kg	7	G	285
	Lagon / Cygon 480 EC / Cygon 480-AG (OP) (reduction only)	0.17 L	2	A or G	60-450
Blister beetle	Sevin XLR Plus (C)	1.01-1.6 L	2	A or G	649
True Armyworm	Sevin XLR Plus (C)	1.01-2.12 L	2	A or G	649
Beet webworm	Sevin XLR Plus (C)	1.01-2.12 L	2	A or G	649
Alfalfa looper	Dibrom (OP)	0.44-0.88 L	4	A or G	345
Alfalfa Caterpillar	Sevin XLR Plus (C)	1.01-2.12L	2	A or G	649
Leafminers					
Alfalfa blotch leafminer	Malathion 85E (OP)	0.544 L	7	A or G	5,500
	Imidan (OP)	0.91 kg	7	G	285
	Lagon / Cygon 480 EC / Cygon 480-AG (OP)	0.22 L	2	A or G	60-450

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: M=microbials, N=neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates

[2] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$

Barley-See Small Grain Cereals

Scouting for insects in Beans (Dry Edible Beans)

BELOWGROUND FEEDERS AND CUTWORMS

Seedcorn Maggot

Typical Damage: Seedcorn maggot attacks bean seed, preventing sprouting or weakening seedlings. The yellowish white maggot is found burrowing in the seeds or emerging stem. Seedcorn maggots are usually most severe in wet, cold seasons and on high organic matter soils.

Cutworms

When and How to Monitor: To find cutworms, dig in the soil to a depth of 2.5 to 5 cm at the base of recently damaged plants.

Nominal Threshold: Treatment is warranted when one cutworm or more is found per metre of row and the larvae are still small (less than 2 cm long).

SAP FEEDERS

Leafhoppers

Typical Damage: Foliage becomes dwarfed, crinkled, and curled. Small triangular brown areas appear at the tips of leaves, gradually spreading around the entire leaf margin.

When and How to Monitor: Leafhopper adults are quick and can be observed by running your hand over the top of the plants as you approach them and observing adults that fly off the plants. On the same plants, turn over each leaf to determine the number of nymphs per trifoliate.

Economic Threshold: Unifoliate stage – 0.25 leafhoppers per trifoliate; second trifoliate stage – 0.5 leafhoppers per trifoliate; fourth trifoliate stage – 1.0 leafhopper per trifoliate; first bloom-2.0 leafhoppers per trifoliate.

DEFOLIATORS

Grasshoppers

Economic Threshold: Substantial yield loss does not occur until up to 35% defoliation occurs before bloom and 15% after bloom.

Beans (Dry Edible) Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[2]
Belowground and Surface Feeders					
Wireworms	Cruiser Maxx Beans (N)	A seed treatment combining Cruiser 5FS and Apron Maxx RTA			
Seedcorn Maggot	Sow seeds as shallow as possible in a warm, well-prepared seedbed. If manure is used, apply and plow it under the previous fall.				
	Cruiser Maxx Beans (N)	A seed treatment combining Cruiser 5FS and Apron Maxx RTA			
	Agrox CD, Agrox B-2, DCT (OP)	See Seed Treatments section of Guide to Crop Protection. For control of Seedcorn maggots only		Seed Treatment	N/A
	Diazinon 50W (OP)	20 g/300 mL water/ 4 L seed		Seed Treatment	1960
Cutworms	Coragen (D)	101 ml	1	A or G	>5,000
	Matador /Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
Sap or Fluid Feeders					
Lygus Bugs	Matador /Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
	Sevin XLR Plus (C)	2.12-2.59 L	5	A or G	649
	Cygon 480-AG (OP)	0.28-0.40 L	7	A or G	60-450

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Potato Leafhoppers	Cruiser Maxx Beans (N)	A seed treatment combining Cruiser 5FS and Apron Maxx RTA			
	Gaucho 480 FL (N)	Apply at a rate of 130 ml per 100 kg seed			
	Matador /Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
	Sevin XLR Plus (C)	1.01 L	5	A or G	649
	Malathion 500 (OP)	0.56-1.21 L	1	A or G	4302
	Malathion 85E (OP)	0.297-0.544 L	3	G	5,500
	Diazinon 50W (OP)	0.40 kg	7	G	1960
	Diazinon 50 EC (OP)	0.445 L	7	G	N/A
	Cygon 480-AG (OP)	0.28-0.40 L	7	A or G	60-450
	Thionex EC (OC)	0.6-1.0 L	2	G	110
	Thiodan (OC)	0.6-1.0 L	2	G	107.2
Aphids	Movento	75 - 111 ml	7	G	>2,000
	Matador (P)	34 – 94 ml	14	A or G	64-110
	Malathion 500 (OP)	0.56-1.21 L	1	A or G	4302
	Malathion 85E (OP)	0.297-0.544 L	3	G	5,500
	Diazinon 50W (OP)	0.40 kg	7	G	1960
	Diazinon 500 E (OP)	0.445 L	3	G	1500
	Diazinon 50 EC (OP)	0.445 L	7	G	N/A
	Dibrom (OP)	0.445-0.890 L	4	A or G	345
	Cygon 480-AG (OP)	0.28-0.40 L	7	A or G	60-450
	Thionex EC (OC)	0.6-1.0 L	2	G	110
	Thiodan (OC)	0.6-1.0 L	2	G	107.2
Defoliators and Borers					
Grasshoppers	**Spreadable Bran Baits**				
	Eco bran (C)	0.8-1.6 kg	5	G	N/A
European Corn Borer	Coragen (D)	101-152 ml	1	A or G	>5,000
	Matador /Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
Variegated Cutworm	Sevin XLR Plus (C)	30-35 mL/100 m of row	5	A or G	649
Green Cloverworm	Thiodan (OC)	0.6-1.0 L	2	G	107.2
Alfalfa looper	Dibrom (OP)	0.445-0.890 L	4	A or G	345

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: D=diamides, N=neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates, OC=organochlorines

[2] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Buckwheat Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Wireworms	Cruiser Maxx Cereals Seed Treatment (N)	325 ml per 100 kg seed		Seed treatment	

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: N=neonicotinoids.

[2] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Scouting for insects in **Canaryseed**

APHIDS

When and How to Monitor: Start checking for aphids when monitoring during the early heading stage of canaryseed. The head should be bent and closely inspected for aphids hiding along the small stem inside the canaryseed head. Also check the stems, underside of leaves, and in the canaryseed boot.

Nominal Threshold: 10 to 20 aphids on 50% of the stems prior to the soft dough stage.

Canaryseed Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Sap Feeders					
Aphids	Lagon / Cygon 480 EC / Cygon 480-AG (OP)	0.20 L	21	A or G	60-450
	Malathion 85E (OP)	0.277 L	14	A or G	5,500

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: OP=organophosphates

[2] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Field Scouting in Canola

Scouting Calendar

Early-season: Flea beetles, cutworms, red turnip beetle, diamondback moth

Mid-season: Diamondback moth, lygus bug, cabbage seedpod weevil, grasshoppers

Late season: Bertha armyworm, diamondback moth, Lygus bugs, grasshoppers, alfalfa looper

Cutworms

Typical Damage: Notched, wilted, dead, or cut-off plants (weed or crop seedlings). Plants missing from rows, bare patches appearing in field.

When and How to Monitor: Look for cutworms, and evidence of cutworm feeding, when monitoring canola in late May to mid-July. Often cutworms will be close to the cut or shriveled plants that they have just damaged. Cutworms will sometimes be most abundant in patches or a specific area of a field.

Nominal Threshold: 25-30% stand reduction. Sometimes it is most economical to just treat infested patches, and not whole fields.

SAP OR FLUID FEEDERS:

Lygus Bugs

Typical Damage: Attacked buds appear shrunken and bleached white. Damaged seeds appear dark brown and shriveled.

When and How to Monitor: Monitor, using an insect sweep net, from the end of flowering until seeds within the pod have become firm. Make 10 180° sweeps with a 37 cm diameter insect net at each of at least 5 sampling site. If while doing these samples populations appear to be of concern, take additional samples; a minimum of 15 samples is needed to accurately determine whether controls are economical. Sample canola for lygus bugs on a sunny day when the temperature is above 20°C and the crop canopy is dry.

Economic Threshold: 10-18 lygus bugs/10 sweeps from the end of flowering to early pod development in the upper canopy and 15-25 lygus bugs/10 seeps in early pod ripening stage. Controls are not recommended when seeds are ripening (yellow or brown). When precipitation is greater than 100 mm from the onset of bud formation to the end of flowering, the crop may partially compensate for plant bug damage.

A table of specific economic thresholds for various expected values of canola seed and costs of control for lygus bugs in canola can be found at: http://www.gov.mb.ca/agriculture/crops/insects/fad12s00.html

Aphids

Economic Threshold: Control aphids in canola if densities exceed 25 aphids/10 cm shoot tip after flowering.

DEFOLIATORS:

Flea beetles

Typical Damage: Shot-holes in leaves to complete destruction of seedling plants in late May through June. Holes chewed in pods in August (occasional).

When and How to Monitor: Look for when monitoring in May through June when crop is in seedling stage. Examine 10 plants at random at each stop. Estimate overall percentage leaf loss.

Economic Threshold: When 25 percent of leaf surface is destroyed and flea beetles are present. If damage is only along the field margins and beetles are still congregated there, then control measures should be applied to the damaged areas only.

Diamondback moth

Typical Damage: Flowers clipped or chewed, outer layers of stem and pods chewed, holes chewed in pods.

When and How to Monitor: Look for when monitoring in late – May through early September. Observing for adults and larvae while taking sweep net samples can determine the presence and relative abundance of diamondback moth in the field. If levels appear to be of concern, shake plants within a 50 cm x 50 cm area and count larvae on the ground or surface (such as a sweep net) that plants were shaken over. Another alternative is to clip or pull the plants and knock over a light colored surface (such as a sweep net, jacket, hood of a car, etc.). Multiply by 4 to get the number of larvae per square metre. Do this in at least 5 areas of the field.

Nominal Threshold: 100 to 150 larvae/m^2 in immature to flowering plants. 200 to 300 larvae/m^2 in plants with flowers and pods. Note that these threshold numbers are based on stands averaging 150-200 plants/m^2. In areas where stands are thinner, the economic threshold should be lowered accordingly. A nominal threshold of 25-33% defoliation with larvae still present can be applied for canola at seedling stage.

Bertha Armyworm

Typical Damage: Outer layers of stems and pods chewed resulting in whitish appearance, holes chewed in pods.

When and How to Monitor: Look for larvae when monitoring fields in late July through early August. Sample at least 3 locations a minimum of 50 metres apart. At each stop, shake plants in a 1/4 m^2 (50 cm x 50 cm) area and carefully check soil surface for dislodged larvae. During heat of the day larvae will often be found under leaves on soil surface. Adult populations can be monitored in June and July using traps baited with a pheromone, which attracts the male moths. This determines the risk of a larval infestation occurring latter.

Economic Threshold: A loss of 0.058 Bu/acre for each larva/m^2 can be expected. Multiplying 0.058 X average number of larvae per m^2 X expected seed value (dollars/acre) will determine the economic loss (in dollars/acre) due to the larvae. Only if control costs (insecticide plus application costs) can be applied for less than this economic loss will insecticide applications be economical. Yield loss may be greater for canola under moisture stress.

At an expected seed value of $6.00/bushel, the economic threshold will be between about 20 and 34 larvae/m^2, depending on control costs. At an expected seed value of $8/bushel, the economic threshold will be between about 15 and 26 larvae/m^2, depending on control costs. Tables showing specific economic thresholds at various expected seed values and control costs can be found at: http://www.gov.mb.ca/agriculture/crops/insects/fad03s01.html

Canola Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Belowground and Surface Feeders					
Cabbage root maggot	• **Increased seeding rates and increased row spacing** (to about 25 to 30 cm) can reduce damage to the roots by root maggots. • **Cultivating** prior to seeding reduces adult emergence from overwintered pupae. Root maggot infestations are greater under zero-till systems than under conventional tillage, but yields under zero tillage usually still exceed those with conventional tillage.				
Cutworms (Army, darksided, redbacked, pale western)	Pounce / Perm-UP (P) Ambush (P)	73 – 158 ml 57-121 ml	Treat prior to 6-leaf stage	G	1276
	Lorsban / Pyrinex / Nufos / Citadel (OP)	0.354-0.486 L	21	A or G	205-418
Sap and Fluid Feeders					
Lygus Bugs	Decis 5EC (P)	60 ml	7	A or G	395
	Matador /Silencer (P)	34 ml	7	A or G	64-110
	Lorsban /Citadel (OP)	0.202 - 0.405 L	21	A or G	205-418
	Pyrinex /Nufos (OP)	0.405 L	21	A or G	205 – 418
Turnip aphid	Lagon /Cygon 480-AG (OP)	0.34-0.36 L	21	A or G	60-450
Aster leafhopper	Lagon /Cygon 480-AG (OP)	0.34-0.36 L	21	A or G	60-450
Swede midge	Matador (P)	34 ml	7	A or G	64-110
Defoliators					
Crucifer Flea beetle and/or striped flea beetle	**Seed Treatments**				
	Helix Vibrance (N)	A seed treatment containing Helix Xtra and Vibrance 500FS			
	Helix Xtra (N)	1500 ml/100 kg of seed	Seed Treatment	Seed Treatment	>5,000
	Acceleron	A seed treatment containing Helix Xtra and Acceleron			N/A
	Prosper (N)		Seed Treatment	Seed Treatment	N/A
	Gaucho Canola System (N)	0.833 L/ 100 kg of seed	Seed Treatment	Seed Treatment	N/A
	Gaucho Platinum (N)	1.667L/100 kg of seed	Seed Treatment	Seed Treatment	N/A
	Sombrero (N)	0.67 – 1.33 L / 100 kg seed	Seed Treatment	Seed Treatment	N/A

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Crucifer Flea beetle and/ or striped flea beetle	**Foliar Sprays**				
	Decis 5EC (P)	40 -60 ml	7	A or G	395
	Ripcord (P)	20 ml	30	G	242-542
	UP-Cyde (P)	56.6 ml	30	A or G	355
	Matador / Silencer (P)	34 ml	7	A or G	64-110
	Pounce (P) Ambush (P)	36-73 ml 28-57 ml		A or G	1276
	Sevin XLR Plus (C)	0.2 L	Seedling application only	A or G	649
	Furadan (C)[3]	60 ml	60	A or G	7.34
	Malathion 500 (OP)	0.44 L	7	A or G	4302
	Malathion 85E (OP)	0.217-0.346 L	7	A or G	5,500
Red Turnip beetle	Furadan (C)[3]	0.11 L	60	A or G	7.34
Cabbage seedpod weevil	Matador / Silencer (P)	34 ml	7	A or G	64-110
	Decis 5EC (for control of adults only) (P)	80 ml	7	A or G	395
Diamondback moth	Decis 5EC (P)	40 – 60 ml	7	A or G	395
	Matador / Silencer (P)	34 ml	7	A or G	64-110
	Malathion 500 (OP)	0.22-0.34 L	7	A or G	4302
	Malathion 85E (OP)	0.109-0.168 L	7	A or G	5,500
	Lorsban / Pyrinex / Nufos / Citadel (OP)	0.405 -0.607L	21	A or G	205-418
Bertha Armyworm	**Seeding as early as possible** and choosing **early maturing varieties of canola** may help minimize damage in years when outbreaks are forecasted.				
	Decis 5EC (P)	40 – 60 ml	7	A or G	395
	Ripcord (P)	28 ml (ground) 36 ml (air)	30	A or G	242-542
	UP-Cyde (P)	81 – 113 ml	30	A or G	355
	Matador / Silencer (P)	34 ml	7	A or G	64-110
	Lannate (C)	87.4 – 206.4 g	8	A or G	30-34
	Lorsban / Pyrinex / Nufos / Citadel (OP)	0.304-0.405 L	21	A or G	205-418
	Monitor (OP)	0.23-0.5 L	10	A or G	17
Alfalfa looper	Lannate (C)	87 – 206 g	8	A or G	30-34
	Lorsban / Pyrinex / Nufos / Citadel (OP)	0.304-0.405 L	21	A or G	205-418

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[2]
Cabbage looper	Matador /Silencer (P)	34 ml	7	A or G	64-110
Beet webworm	Decis 5EC (P)	40 – 60 ml	7	A or G	395
	Lannate (C)	87.4 – 206.4 g	8	A or G	30-34
Clover cutworm	Decis 5EC (P)	40 – 60 ml	7	A or G	395
	Lannate (C)	87.4-206.4 g	8	A or G	30-34
True armyworm	Lorsban / Pyrinex / Nufos / Citadel (OP)	0.304-0.405 L	21	A or G	205-418
Imported Cabbageworm	Matador /Silencer (P)	34 ml	7	A or G	64-110
Variegated cutworm	Lorsban / Pyrinex / Nufos / Citadel (OP)	0.354-0.486	21	A or G	205-418
Grasshoppers	**Spreadable Bran Baits**				
	Eco bran (C)	0.8-1.6 kg	Treat only seedlings	G	N/A
	Sprays				
	Decis 5EC (P)	40 – 60 ml (Ground); 60 ml (Aerial)	7	A or G	395
	Matador /Silencer (young grasshoppers only) (P)	25 – 34 ml (Ground) 34 ml (Aerial)	7	A or G	64-110
	Ripcord (young grasshoppers only) (P)	20 – 28 ml	30	G	242-542
	Malathion 500 (OP)	0.45-0.69 L	7	A or G	4302
	Malathion 85E (OP)	0.217-0.346 L	7	A or G	5,500
	Lorsban / Pyrinex / Nufos / Citadel (OP)	0.235-0.354 L	21	A or G	205-418
	Lagon / Cygon 480-AG / Cygon 480 EC (OP)	0.34-0.36 L	21	A or G	60-450
	Monitor (OP)	0.5 L	10	A or G	17
Slugs	Sluggo Professional	10-20 kg		G	>5,000

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: N=neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates

[2] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

[3] The United States has revoked all carbofuran tolerances (residue limits in food). Caution should be used if producing canola for export.

Chickpeas Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[2]
Belowground and Surface Feeders					
Wireworms	Cruiser Maxx Pulses (N)	A seed treatment containing Cruiser 5FS and Apron Maxx RFC			
Cutworms	Coragen (D)	101 ml	1	A or G	>5,000
	Matador /Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
Sap Feeders					
Pea Aphids	Movento	75 - 111 ml	7	G	>2,000
	Matador /Silencer (P)	34 – 94 ml	14 (Matador) 21 (Silencer)	A or G	64-110
Potato Leafhopper	Matador /Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
Defoliators					
Grasshoppers	Matador /Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: D=diamides, P=pyrethroids, N=neonicotinoids.

[2] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

Field Scouting in **Corn** (Field Corn)

Cutworms

Typical Damage: Notched, wilted, dead, or cut-off plants (weed or crop seedlings). Plants missing from rows, bare patches appearing in field.

When and How to Monitor: Look for cutworms, and evidence of cutworm feeding, when monitoring corn in late – May to mid-July. Often cutworms will be close to the cut or shriveled plants that they have just damaged. Cutworms will sometimes be most abundant in patches or a specific area of a field. At each stop, examine 100 plants in a row. Calculate percentage of plants cut off or showing leaf feeding.

Economic Threshold: When 3-6% of plants are cut and small larvae less than 1 inch present. Sometimes it is most economical to just treat infested patches, and not whole fields.

European corn borer

Typical Damage: Shot-holes in leaves. Holes in stalk, tassels and ears. Damage may cause stalk breakage prior to harvest or cobs to fall to the ground. Nutrient flow in the plant may be restricted, resulting in smaller cobs.

When and How to Monitor: Begin looking for European corn borer when field scouting in early July. At 5 locations, examine 10 plants for young larvae and egg masses. Calculate percentage of plants infested. Scout every 5 to 7 days until the end of July or larvae start to tunnel into the stalks.

Economic Threshold: The level of European corn borer where control becomes economical depends on the value of the crop, and cost of control. Information on determining specific economic thresholds for European corn borer in corn can be found at http://www.gov.mb.ca/agriculture/crops/insects/fad46s00.html, or from your local agriculture office. These thresholds are based on a 5% yield loss per corn borer per plant on average. If the majority of larvae have bored into the stalk, do not apply insecticide, as they are ineffective once the larvae have entered the stalk.

Corn (Field Corn) Insect Management Chart

Insect	Insecticide (and insecticide group^1)	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)^2
Belowground and Surface Feeders					
Cutworms	Matador / Silencer (P)	34 ml	14	A or G	64-110
	Ripcord (black, white, darksided, redbacked, army, pale western) (P)	70 ml	21	G	242-542
	Pounce / Perm-UP (P) Ambush (P)	73 – 158 ml 57-121 ml	Treat prior to 6 leaf stage	G	1030
	Lorsban / Pyrinex / Nufos / Citadel (darksided, black, redbacked) (OP)	0.971 L (Pre-plant treatment), 0.486-0.971 L (seedling treatment)	70	G	205-418
Wireworms	Cruiser Extreme 250 (N)	A seed treatment combining Cruiser 5FS, Maxim XL, Apron XL, and Dynasty 100FS			
	Poncho 250 (N)	0.25 mg of Poncho 600 per kernel	Seed Treatment	Seed Treatment	500-1,000
	Sombrero (N)	0.16 mg per kernel	Seed Treatment	Seed Treatment	N/A
Seedcorn maggot	Cruiser Extreme 250 (N)	A seed treatment combining Cruiser 5FS, Maxim XL, Apron XL, and Dynasty 100FS			
	Poncho 250 (N)	0.25 mg of Poncho 600 per kernel	Seed Treatment	Seed Treatment	500-1,000
	Agrox CD (OP)	50 g/25 kg of seed	Seed Treatment	Seed Treatment	N/A
	Agrox B-2 (OP)	See label	Seed Treatment	Seed Treatment	N/A
	Diazinon 50W (OP)	20 g/300 mL water/4L of seed	Seed Treatment	G	1960
Sap Feeders					
Corn leaf aphid	Thiodan/Thionex EC (OC)	1.11 L	50	G	110
Spider mites	Oberon	162-243 ml	Green forage – 5 Grain or stover – 30	A or G	>2,000
Defoliators and Borers					
Grasshoppers	**Spreadable Bran Baits**				
	Eco bran (C)	0.8-1.6 kg	1	G	N/A
	Sprays				
	Sevin XLR Plus (C)	0.50-1.01 L	1	A or G	649

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
European Corn Borer	**Stalk Management:** Primary tillage such as chisel plowing or moldboard plowing in the fall can reduce overwintering populations. Mowing corn stalks after harvest can reduce overwintering populations up to 85%. **Resistant Cultivars:** Some cultivars of Bt corn are resistant to feeding by European corn borer. If planting cultivars of Bt corn, a refuge of non-Bt cultivars is required to be planted to reduce the odds of European corn borer developing resistance to Bt corn. Growers of Bt corn are also required to monitor their crop for the presence of European corn borer and any feeding damage. A table of registered Bt corn products in Canada (as of September 2011) is available at: http://www.cornpest.ca/index.cfm/bt-corn/registered-bt-hybrids/				
	Dipel 2X DF (M)	0.23-0.45 kg	0	G	>4,000
	Coragen (D)	101 – 152 ml	14	G	>5,000
	Matador/ Silencer (P)	34-76 ml	14 (silage) 21 (field corn)	A or G	64-110
	Decis 5EC (P)	0.1-0.12 L	N/A	G	395
	Ripcord (P)	70 ml	5	A or G	242-542
	UP-Cyde (P)	113 ml	5	A or G	355
	Sevin XLR Plus (C)	1.01-1.6 L	1	A or G	649
	Furadan (C)[3]	0.445 L	7	A or G, see guide	7.34
	Malathion 85E (OP)	0.445-0.544 L	5	A or G	5,500
Corn Earworm	Some cultivars of Bt corn are resistant to feeding by corn earworm.				
	Coragen (D)	101 – 152 ml	14	G	>5,000
	Matador/ Silencer (P)	34-76 ml	14 (silage) 21 (field corn)	A or G	64-110
	Ripcord (P)	70 ml	5	A or G, see product label	242-542
	Sevin XLR Plus (C)	1.01-1.6 L	1	A or G	649
	Malathion 85E (OP)	0.445-0.544 L	5	A or G	5,500
	Thionex EC (OC)	1.11-1.62 L	50	G	110
	Thiodan (OC)	1.11-1.72 L	50	G	N/A
Armyworm	Coragen (D)	101 – 152 ml	14	G	>5,000
	Matador /Silencer (P)	34 ml	14 (silage) 21 (field corn)	A or G	64-110
Fall armyworm	Some cultivars of Bt corn are resistant to feeding by fall armyworm				
	Coragen (D)	101 – 152 ml	14	G	>5,000
	Matador/Silencer (P)	34 ml	14	A or G	64-110
	Pounce (P)	73 ml	1	G	1030
	Sevin XLR Plus (C)	1.01-1.6 L	1	A or G	649

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: M=microbials, D=diamides, N=neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates, OC=organochlorines

[2] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

[3] The United States has revoked all carbofuran tolerances (residue limits in food). Caution should be used if producing corn for export.

Fababean Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Belowground Feeders					
Cutworms	Coragen (D)	101 ml	1	A or G	>5,000
Wireworms	Cruiser Maxx Pulses (N)	A seed treatment containing Cruiser 5FS and Apron Maxx RFC			
Sap and Fluid Feeders					
Lygus Bugs	Matador / Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
Potato Leafhopper	Matador / Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
Pea Aphid	Matador / Silencer (P)	34 - 94 ml	14 (Matador) 21 (Silencer)	A or G	64-110

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: D=diamides, N=neonicotinoids, P=pyrethroids.

[2] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Field Scouting in Flax

Cutworms

Typical Damage: Notched, wilted, dead, or cut-off plants (weed or crop seedlings). Plants missing from rows, bare patches appearing in field.

When and How to Monitor: Look for cutworms, and evidence of cutworm feeding, when monitoring in late May to mid-July. Often cutworms will be close to the cut or shriveled plants that they have just damaged. Cutworms will sometimes be most abundant in patches or a specific area of a field. In areas of the field where cutworm damage is noticeable, check around damaged plants in a 0.25 m^2 (50cm x 50cm) areas. Use trowel or shovel to carefully search through top 5 cm of soil for cutworm larvae. Multiply the number of cutworms found by 4 to get the number per m^2. Repeat in several locations to get an accurate assessment of what cutworm levels are.

Economic Threshold: 4-5 larvae/m^2. Sometimes it is most economical to just treat infested patches, and not whole fields.

Aphids

Typical Damage: Extract plant fluids from the stems, leaves and developing bolls. Can cause fewer seeds to be produced.

When and How to Monitor: The easiest way to detect aphids in flax is to sample the upper portions of the plant with an insect sweep net when the crop is in full bloom, or tap plants over a white tray or bucket. If aphids are found, fields need to be more closely inspected by randomly sampling plants. To inspect plants, lightly tap the plants on a white surface, such as a tray or the canvas of a sweep net, to dislodge the insects. Plants can be severed at the base prior to tapping if desired. Inspect a minimum of 25 plants at full bloom and 20 plants at early green boll randomly in the field to provide an accurate estimate of aphid density. Record total number of aphids and calculate average per plant.

If control is not warranted at full bloom, aphid densities should be assessed again at the green boll stage.

Economic Threshold: Varies with crop value and control costs, but generally about 3 aphids per main stem at full bloom or 8 aphids per main stem at the green boll stage.

The yield loss of flax is 0.3346 bu/acre per aphid per plant for crops sampled at full bloom and 0.1275 bu/acre per aphid per plant for crops sampled at the green boll stage.

The potato aphid is highly susceptible to attack by fungi (especially in years of high rainfall and humidity in late June and July). Aphid populations sampled at full bloom that have many diseased insects should be sampled again at the early green boll stage to determine the effect of the disease on aphid densities.

Beet webworm

Nominal Threshold: >10 larvae/m^2

Flax Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[2]
Belowground and Surface Feeders					
Wireworm	No insecticides registered for the control of wireworms in flax				
Cutworms (Army, darksided, redbacked, pale western)	Decis 5EC (P)	80 ml	40	A or G	395
	Pounce / Perm-UP (P) Ambush (P)	73 – 158 ml 57-121 ml	Treat prior to 6 leaf stage	G	1030
	Lorsban / Pyrinex / Nufos / Citadel (OP)	0.354-0.486 L	21	A or G	205-418
Sap Feeders					
Potato Aphid	Lagon /Cygon 480 EC / Cygon 480-AG (OP)	0.18 L	21	A or G	60-450
Defoliators					
Grasshoppers	Decis 5EC (P)	40 – 60 ml	40	A or G	395
	Matador /Silencer (young grasshoppers only) (P)	25 – 34 ml (Ground) 34 ml (Aerial)	7	A or G	64-110
	Malathion 500 (OP)	0.44-0.68 L	7	A or G	4302
	Malathion 85E (OP)	0.217-0.346 L	7	A or G	5,500
Bertha Armyworm	Lannate (C)	89 – 109 g	8	A or G	30-34
	Lorsban / Pyrinex / Nufos / Citadel (OP)	0.304-0.405 L	21	A or G	205-418
True Armyworm	Lorsban / Pyrinex / Nufos / Citadel (OP)	0.354-0.486 L	21	A or G	205-418
Clover Cutworm	Decis 5EC (P)	40 – 60 ml	40	A or G	395
Variegated cutworm	Lorsban / Pyrinex / Nufos / Citadel (OP)	0.354-0.486 L	21	A or G	205-418
Beet Webworm	Decis 5EC (P)	40 – 60 ml	40	A or G	395

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: P=pyrethroids, C=carbamates, OP=organophosphates, OC=organochlorines

[2] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

Forage Grasses (Timothy, etc.) Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Defoliators					
Grasshoppers	**Spreadable Bran Baits**				
	Eco bran (C)	0.8-1.6 kg	1-2	G	N/A
	Sprays				
	Matador /Silencer (P) (on timothy)	25 – 34 ml	14	G	64-110
	Sevin XLR Plus (C)	0.49-0.93 L (for nymphs or sparse vegetation) 0.93-1.42 L (for adults or application to dense vegetation)	1	A or G	649
	Malathion 500 (OP)	0.69 L	7	A or G	4302
	Lagon /Cygon 480-AG (OP)	0.17 – 0.22 L (nymphs) 0.34 – 0.40 L (adults)	2-28	A or G	60-450
European skipper (on timothy)	0.34 – 0.40 L (adults)	2 - 28	A or G	60-450	>4,000
Armyworm (on forage grasses for seed production only)	Coragen (D)	101 – 152 ml	0	G	>5,000

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: M=microbials, D=diamides, P= pyrethroids, C=carbamates, OP=organophosphates

[2] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Field Scouting in Lentils

Grasshoppers

When and How to Monitor: Look for when monitoring fields from the early bud stage through pod development.

Economic Threshold: 2 grasshoppers/m² during the flowering and podding stages, especially if two-striped grasshopper is the dominant species.

Lygus Bugs

When and How to Monitor: Look for adult lygus bugs when monitoring lentils during blooming and podding by using a sweep net, making 25 180° sweeps in at least 5 randomly selected places in a field.

Economic Threshold: Insecticide treatment is recommended when 10 or more adults are collected per 25 sweeps.

Pea aphid

Economic Threshold: 30-40 aphids per 180° sweep of a 38 cm (15 inch) diameter insect net, and few natural enemies are present, and when aphid numbers do not decline over a 2-day period.

Lentil Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Belowground and Surface Feeders					
Wireworms	Cruiser Maxx Pulses (N)	A seed treatment containing Cruiser 5FS and Apron Maxx RFC			
Cutworms	Coragen (D)	101 ml	1	A or G	>5,000
	Decis 5EC (P)	80 ml	30	A or G	395
	Matador /Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
	Pounce / Perm-UP (P) Ambush (P)	73 – 158 ml 57-121 ml	Treat prior to 6-leaf stage	G	1030
	Lorsban / Pyrinex / Nufos/ Citadel (for pale western cutworm only) (OP)	0.354-0.486 L	21-60	A or G	205-418
Sap and Fluid Feeders					
Lygus Bugs	Matador /Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
Potato Leafhopper	Matador /Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
Pea Aphid	Movento	75 - 111 ml	7	G	>2,000
	Matador /Silencer (P)	34 – 94 ml	14 (Matador) 21 (Silencer)	A or G	64-110
Defoliators					
Grasshoppers	Decis 5EC (P)	40-60 ml (ground) 60 ml (air)	30	A or G	395
	Matador /Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
	Malathion 500 (OP)	0.68 L	30	A or G	4302
	Malathion 85E (OP)	0.336 L	14	A or G	5,500
	Lorsban / Pyrinex / Nufos / Citadel (OP)	0.235-0.486 L	21-60	A or G	205-418

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: D=diamides, N=neonicotinoids, P= pyrethroids, OP=organophosphates

[2] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Mustard Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Belowground Feeders					
Root Maggot	No insecticides registered				
Sap Feeders					
Lygus Bugs	Decis 5EC (P)	60 ml	7	A or G	395

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[2]
Defoliators					
Flea beetles	**Seed Treatments**				
	Helix (N)	1500 ml/100 kg of seed	N/A	Seed Treatment	>5,000
	Helix Xtra (N)	1500 ml/100 kg of seed	N/A	Seed Treatment	>5,000
	Prosper (N)		Seed Treatment	Seed Treatment	N/A
	Gaucho Canola System (N)	0.833 L/100 kg of seed	N/A	Seed Treatment	N/A
	Gaucho Platinum (N)	1.667 L/100 kg of seed	N/A	Seed Treatment	N/A
	Sombrero (N)	0.67 – 1.33 L /100 kg seed	Seed Treatment	Seed Treatment	N/A
	Sprays				
	Decis 5EC (P)	40 – 60 ml	7	A or G	395
	Matador /Silencer (P)	34 ml	7	A or G	64-110
	UP-Cyde (P)	57 ml	30	G	355
	Furadan 480F[3] (C)	60 ml	21	A or G	7.34
	Malathion 85E (OP)	0.217-0.346 L	7	A or G	5,500
Red Turnip Beetle	Furadan 480F (C)[3]	0.11 L	21	A or G	7.34
Cabbage seedpod weevil	Note: Yellow mustard (*Sinapis alba*) is resistant to cabbage seedpod weevil; oriental and brown mustards (*Brassica juncea*) are susceptible to feeding by cabbage seedpod weevil.				
	Matador /Silencer (adults) (P)	34 ml	7	A or G	64-110
	Decis 5 EC (for control of adults only) (P)	80 ml	7	A or G	395
Diamondback Moth	Decis 5 EC (P)	40 – 60 ml	7	A or G	395
	Matador /Silencer (P)	34 ml	7	A or G	64-110
	Malathion 85E (OP)	0.109-0.168 L	7	A or G	5,500
Bertha Armyworm	Decis 5EC (P)	40 – 60 ml	7	A or G	395
	Matador /Silencer (P)	34 ml	7	A or G	64-110
	UP-Cyde (P)	81 – 113 ml	30	G	355
Clover Cutworm	Decis 5EC (P)	40 – 60 ml	7	A or G	395
Imported cabbageworm	Matador /Silencer (P)	34 ml	7	A or G	64-110
Cabbage looper	Matador /Silencer (P)	34 ml	7	A or G	64-110
Beet webworm	Decis 5EC (P)	40 – 60 ml	7	A or G	395
Grasshopper	Matador /Silencer (young grasshoppers only) (P)	25- 34 ml(Ground) 34 ml (Aerial)	7	A or G	64-110
	Malathion 85E (OP)	0.217-0.346 L	7	A or G	5,500

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: N= neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates

[2] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

[3] The United States has revoked all carbofuran tolerances (residue limits in food). Caution should be used if producing mustard for export.

Oats - See small grain cereals

Grasshopper Management on **Pastures, Rangelands, Hay, Headlands,** and **Roadsides**

Note: Insects for biological control of weeds such as leafy spurge may be introduced and established in some areas of Manitoba and Saskatchewan. If grasshopper numbers become high, consider using control strategies and insecticides that will minimize harm to these biological control agents.

Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Reduced Agent and Area Treatments (RAATs): Grasshoppers on rangelands may be managed by applying certain insecticides in treated swaths, which alternate with untreated swaths. This can reduce the cost of control and amount of insecticide used by more than 50 percent, while resulting in effective control. For more information on managing grasshoppers by this method see: http://www.grasshoppercontrol.com/pdf/RAATs%20program%20Revised.pdf				
Spreadable Bran Baits				
Nolo Bait (Pastures, Rangelands)	Minimum of 0.45 kg		A or G	
Eco bran (pastures, rangelands, field borders, headlands, right-of-way, roadsides, wastelands) (C)	0.8-1.6 kg	0-2 (see label)	G	N/A
Sprays				
Decis 5EC (Rangeland, pastures, roadside) (P)	40 – 60 ml	N/A	A or G (Rangeland, pastures) G (Roadsides)	395
Ripcord (Roadsides, headlands, and summerfallow) (young grasshoppers only) (P)	20 – 28 ml	Treated areas must not be grazed or cut or hay.	G	242-542
Matador (Unimproved pasture, summerfallow) (young grasshoppers only) (P)	25 – 34 ml (Ground) 34 ml (Aerial)	3	A or G	64-110
Silencer (Unimproved pasture) (young grasshoppers only) (P)	25 – 34 ml (Ground) 34 ml (Aerial)	3	A or G	64-110
Sevin XLR Plus (ditchbanks, field borders, headlands, pastures, rangelands, right-of-way, wastelands) (C)	0.48-1.41 L	0 (ditchbanks, field borders, headlands, right-of-way, wasteland); 1 (pastures, rangeland)	A or G	649
Malathion 500 (Hay only) (OP)	0.69 L	7	A or G	4302
Malathion 85E (pastures, rangelands) (OP)	0.336 L	Do not apply to fields occupied by dairy animals, but may be grazed or harvested on the day of application.	G	5,500

Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Diazinon (Rangeland, pasture, ditch banks, roadsides, fence rows, wasteland) (OP)	0.445 L (Diazinon 500E and 50EC) 0.445 kg (Diazinon 50W)	Do not spray livestock directly. Dairy and Beef cattle and sheep may be grazed or fed green forage immediately following application. Hay may be fed if not cut for 21 days following application.	G	1500 (500 E) 1960 (50W)
Dibrom (Rangeland, pastures, dairy and horse paddocks) (OP)	0.22-0.34 L (young grasshoppers) 0.28-0.4 L (adult grasshoppers)	4	A or G	345
Lagon / Cygon 480 EC / Cygon 480-AG (pasture, wasteland) (OP)	0.22 L (nymphs) 0.34-0.41 L (Adults)	2 days – 0.22L rate 7-28 days – 0.34-0.41L rates (see labels)	A or G	60-450
Lagon (Hay) (OP)	0.17-0.22 L	2	A or G	60-450
Lorsban / Pyrinex / Nufos / Citadel (OP)	Ungrazed and unoccupied areas such as roadsides, right of way, and fence lines adjacent to barley, wheat, oats, or canola, and lentils.		A or G	205- 418

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: P=pyrethroids, C=carbamates, OP=organophosphates

[2] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Field Scouting in Peas (Field Peas)

Cutworms

Nominal Threshold: 2 to 3 cutworms per square metre.

SAP FEEDERS

Aphids

When and How to Monitor: Look for when monitoring field peas at the beginning of flowering. Take 180° sweeps or check 10 8-inch (20 cm) plant tips at each stop. Record total number of aphids and calculate average per sweep or plant tip.

Economic Threshold: If, at the beginning of flowering, there are 9 to 12 aphids per sweep or 2-3 aphids per 8-inch (20 cm) plant tip, an insecticide application when 50 percent of plants have produced some young pods will be cost-effective.

Peas (Field Peas) Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[2]
Belowground and Surface Feeders					
Wireworms	Cruiser Maxx Pulses (N)	A seed treatment containing Cruiser 5FS and Apron Maxx RFC			
Seedcorn Maggot	Diazinon 50W (OP)	20g/300ml water/4L seed	Seed Treatment	Seed Treatment	1960
	Agrox CD (OP)		Seed Treatment	Seed Treatment	N/A
	Agrox B-2 (OP)		Seed Treatment	Seed Treatment	N/A
Cutworms (Army, black, darksided, pale western, red-backed, white)	Coragen (D)	101 ml	1	A or G	>5,000
	Matador /Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
	Pounce / Perm-UP (P) Ambush (P)	73 – 158 ml 57-121 ml	Treat prior to 6 leaf stage	G	1030
Sap and Fluid Feeders					
Leafhoppers	Malathion 85E (OP)	0.445 L	3	A or G	5,500
Pea Aphid	Movento	75 – 111 ml	7	G	>2,000
	Matador /Silencer (P)	34 - 94 ml	14 (Matador) 21 (Silencer)	A or G	64-110
	Lannate (C)	0.206 kg	1	G	30-34
	Malathion 85E (OP)	0.445 L	3	A or G	5,500
	Lagon/Cygon 480 EC (OP)	0.11-0.17 L	3–21 (see labels)	A or G	60-450
Defoliator					
Grasshoppers	Matador /Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110
Alfalfa Looper	Sevin XLR Plus (C)	1.90 L	3	G	649
	Lannate (C)	0.206 kg	1	G	30-34
Pea leaf weevil	Cruiser Maxx Pulses (N)	A seed treatment combining Cruiser 5FS and Apron Maxx RTA			
	Matador /Silencer (P)	34 ml	14 (Matador) 21 (Silencer)	A or G	64-110

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: D=diamides, N=neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates OC=organochlorines.

[2] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

Scouting and Thresholds for Insects in Potatoes

Aphids

Typical damage: Several species of aphids are sap feeders on potato leaves. At very high numbers this sap feeding may cause plants to wilt in small localized areas of the field as "aphid holes". The greatest injury is due to transmission of viruses. Identification and control of aphids is critical in potato seed production to prevent virus spread. In commercial production tuber quality may be reduced by net necrosis of tubers.

When and How to Monitor: Aphid identification and scouting should start in early July when aphids begin to be observed in fields. Sample 25 lower canopy leaves from each of 4 areas in the field (100 leaves in total). Count potato aphids and green peach aphids on each compound leaf, using a magnifying device to identify the species.

Economic threshold: For seed potatoes = 3-10 green peach aphids / 100 leaves. For processing potatoes = 30-100 green peach aphids/100 leaves. There are no economic thresholds for buckthorn and potato aphids. These thresholds relate to transmission of potato leafroll virus and are not useful in determining infectivity relative to potato virus Y. No economic thresholds have been established for aphids that relate to potato virus Y transmission.

Leafhoppers

Typical damage: the potato leafhopper injects a toxin into the plant which results in hopper burn, a yellowing and curling of the tips and margins of the leaflets, which ultimately turn brown and brittle. Damaged plants die prematurely and yield may be reduced.

When and How to Monitor: Nymphs are scouted by visual inspection; sample 100 plants from 3-5 areas of the field. Count the wingless nymphs on compound leaves taken from mid canopy. Adults are sampled with a sweep net (20 sweeps per location at 5 locations for a total of 100 sweeps).

Economic threshold: Nymphs-1 nymph per 10 leaves. Adults-1 leafhopper per sweep.

Colorado potato beetle

Typical damage: Larvae feeding may cause extensive defoliation of leaves and is capable of transmitting spindle tuber virus and bacterial ring rot.

When and How to Monitor: Start scouting for larvae 2 weeks after crop emergence. On field edges, count number of beetles on 20 separate plants. Record % defoliation of leaves. Repeated scouting is required since beetles have developed resistance to many insecticides and 2 generations may occur during the year.

Economic threshold: Economic threshold based on beetle numbers may vary by cost of treatment, expected returns and variety. Typical thresholds are 18 larvae/ 20 plants for Russet Burbank vs 6 larvae/20 plants for Norland. Treat when defoliation exceeds 10%.

Potato flea beetle

Typical damage: Beetle feeding causes "shot holes" in the leaves. Two generations may attack the foliage.

When and How to Monitor: Estimate feeding damage on the leaf or numbers of beetles on plants.

Economic threshold: Early in the season treat if greater than 10% defoliation. Later in the season (August) treat if greater than 25% defoliation or with greater than 65 beetles per plant for Norland or 300 beetles per plant for Russet Burbank.

Potatoes* Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate / Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
		Belowground and Surface Feeders			
Wireworms	Titan (N)	20.8 ml per 100 kg potato seed pieces			2,000
	Pyrifos 15G (OP)	0.1 kg per 100 metres of row	70	G	
	Pyrinex 480 EC (OP)	0.97 L (based on 90 cm row spacing).	70	G	409
	Thimet (OP)	0.14 kg in sandy soils 0.215 kg in heavy soils	At planting application. Do not harvest before 90 days after planting time.	G	27-31

Insect	Insecticide (and insecticide group[1])	Rate / Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Cutworms (Army, darksided, pale western, redbacked, black, white)	Pounce / Perm-UP (P) Ambush (P)	73 – 158 ml 57-121 ml	Treat prior to 6-leaf stage	G	1276
	Ripcord (P)	70 ml	21	G	242-542
	Lorsban/ Pyrinex/ Nufos/ Citadel (Redbacked, black, and darksided cutworms only) (OP)	0.971 L (pre-plant) 0.486-0.971 L (seedling)	7	G	205 – 418
Sap or Fluid Feeders					
Aphids	**Seed Piece Treatments**				
	Actara 240SC (N)	See chart on label	N/A	Seed Treatment	>5,000
	Admire SPT / Alias 240 SC / Grapple /Grapple$_2$ (N)	11.79 – 17.69 ml per 100 pounds (45.36 kg) of potato seed tubers	N/A	Seed Treatment	>4,870
	Cruiser Maxx D Potatoes (N)	See chart on label	NA	Seed Treatment	
	Titan (N)	10.4-20.8 ml per 100 kg potato seed pieces	N/A	Seed Treatment	2,000
	In-Furrow Application				
	Actara 240SC (N)	0.15-0.20 L (based on 90 cm row spacing).		G	>5,000
	Admire 240 F / Alias 240 SC / Grapple /Grapple$_2$ (N)	0.344-0.526 L (based on 90 cm row spacing).		G	4143-4870
	Foliar Sprays				
	Fulfill (HFB)	78.1 g	14	A or G	>5,000
	Beleaf (HFB)	49-65 g	7	G	
	Movento	89 – 148 ml	7	A or G	>2,000
	Actara 240SC (N)	44.1 ml	7	A or G	
	Actara 25WG (N)	42.5 g	7	A or G	>5,000
	Admire 240 F / Alias 240 SC / Grapple /Grapple$_2$ (N)	81 ml	7	G	4143-4870
	Assail (N)	22.7-34.8 g	7	G	1,064
	Clutch (N)	28-43 g	14	A or G	
	Concept (N + P)	263 ml	7	G	
	Lannate (C)	0.2185 kg	3	G	30-34
	Vydate (C)	0.93-1.21 L	7	G	9-10
	Malathion 500 (OP)	0.56-0.80 L	3	A or G	4302
	Malathion 85E (OP)	0.297-0.445 L	3	G	5,500
	Diazinon 50 W (OP)	0.445 kg	14	G	1960
	Diazinon 500E (OP)	0.445 L	14	G	1500
	Diazinon 50 EC (OP)	0.445 L	14	G	N/A
	Lagon /Cygon 480 EC / Cygon 480-AG (OP)	0.22-0.44 L	7	G	60-450
	Monitor (OP)	0.71-0.91 L	14	A or G	17
	Imidan (OP)	0.91 kg	7	G	285
	Orthene (OP)	0.30-0.44 kg	21	G	1030-1447
	Thionex 50W (OC)	0.45-0.61 kg	1	G	110
	Thionex EC (OC)	0.6-0.8 L	2	G	110
	Thiodan (OC)	0.6-0.8 L	1	G	107.2

Insect	Insecticide (and insecticide group[1])	Rate / Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[2]
Potato psyllid	Movento	89 – 148 ml	7	A or G	>2,000
Leafhoppers	**Seed Piece Treatments**				
	Actara 240SC (N)	See chart on label	N/A	Seed Treatment	>5,000
	Admire SPT / Alias 240 SC / Grapple / Grapple$_2$ (N)	11.79 - 17.69 ml per 100 pounds (45.36 kg) of potato seed tubers	N/A	Seed Treatment	>4,870
	Cruiser Maxx D Potatoes (N)	See chart on label	NA	Seed Treatment	
	Titan (N)	10.4-208 ml per 100 kg potato seed pieces	N/A	Seed Treatment	2,000
	In-Furrow Application				
	Actara 240SC (N)	0.15-0.20 L (based on 90 cm row spacing).		G	>5,000
	Admire 240F / Alias 240 SC / Grapple / Grapple$_2$ (N)	0.344-0.526 L (based on 90 cm row spacing).	N/A	G	4143-4870
	Foliar Sprays				
	Actara 240SC (N)	44.1 ml	7	A or G	
	Actara 25WG (N)	42.5 g	7	A or G	
	Clutch (N)	28-43 g	14	A or G	
	Pounce / Perm-UP (P)	73 – 105 ml	1	A or G	1276
	Decis 5EC (P)	40 – 60 ml	3	A or G	395
	Matador / Silencer (P)	34 ml	7	A or G	64-110
	Ripcord (P)	25 – 50 ml	7	A or G	242-542
	UP-Cyde (P)	57 ml	7	A or G	355
	Concept (N + P)	263 ml	7	G	
	Sevin XLR Plus (C)	0.50 L	7	A or G	649
	Lannate (C)	0.2185 kg	3	G	30-34
	Vydate (C)	0.93-1.21 L	7	G	9-10
	Furadan[3] (C)	0.445 L	7	G	7.34
	Malathion 500 (OP)	0.56-0.80 L	3	A or G	1375-2800
	Malathion 85E (OP)	0.297-0.445 L	3	G	5,500
	Diazinon 50 W (OP)	0.445 Kg	14	G	1960
	Diazinon 500E (OP)	0.445 L	14	G	1500
	Diazinon 50 EC (OP)	0.445 L	14	G	NA
	Lagon / Cygon 480 EC / Cygon 480-AG (OP)	0.22-0.44 L	7	G	60-450
	Monitor (OP)	0.71-0.91 L	14	A or G	17
	Dibrom (OP)	0.44 L	4	A or G	345
	Imidan (OP)	0.91 kg	7	G	285
	Orthene (OP)	0.30-0.44 kg	21	G	1030-1447
	Thionex 50W (OC)	0.45-0.61 kg	1	G	110
	Thionex EC (OC)	0.6-0.8 L	2	G	110
	Thiodan (OC)	0.6-0.8 L	1	G	107.2

Insect	Insecticide (and insecticide group[1])	Rate / Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[2]
Lygus bugs	Pounce / Perm-UP (P) Ambush (P)	73 – 105 ml 57-81 ml	1	A or G	1276
	Decis 5EC (P)	40 – 60 ml	3	A or G	395
	Matador /Silencer (P)	34 ml	7	A or G	64-110
	Ripcord (P)	50 ml	7	A or G	242-542
	UP-Cyde (P)	81 ml	7	A or G	355
	Concept (N + P)	263 ml	7	G	
	Sevin XLR Plus (C)	2.12 – 2.59 L	7	A or G	649
	Vydate (C)	0.93-1.21 L	7	G	9-10
	Furadan[3] (C)	0.445 L	7	G	7.34
	Lagon /Cygon 480 EC (OP)	0.22-0.44 L	7	G	60-450
	Lorsban / Pyrinex / Nufos / Citadel (nymphs only) (OP)	0.405 L	7	G	205 – 418
	Orthene (OP)	0.30-0.44 kg	21	G	1030-1447
	Thionex 50W (OC)	0.45-0.61 kg	1	G	110
	Thionex EC (OC)	0.6-0.8 L	1	G	110
	Thiodan (OC)	0.6-0.8 L	1	G	107.2
			Defoliators		
Colorado potato beetle	Note: Colorado potato beetles have been found to be resistant to several families of insecticides in localized areas of Manitoba. Rotation between different families of insecticides is essential.				
	Seed Piece Treatments				
	Actara 240SC (N)	See chart on label	N/A	Seed Treatment	>5,000
	Admire SPT / Alias 240 SC / Grapple /Grapple$_2$ (N)	11.79 – 17.69 ml per 100 pounds (45.36 kg) of potato seed tubers	N/A	Seed Treatment	>4,870
	Cruiser Maxx D Potatoes (N)	See chart on label	NA	Seed Treatment	
	Titan (N)	10.4-20.8 ml per 100 kg potato seed pieces	N/A	Seed Treatment	2,000
	In-Furrow Application				
	Actara 240SC (N)	0.15-0.20 L (based on 90 cm row spacing).		G	>5,000
	Admire / Alias 240 SC / Grapple /Grapple$_2$ (N)	0.345 -0.525 L	7	G	4143-4870
	Clutch (N)	108-181 g (based on 90 cm row spacing)	14	G	
	Foliar Sprays				
	Rimon (SB)	0.17-0.33 L	14	G	>5,000
	Entrust (S)	20-40 g	7	G	>5,000
	Success (S)	34 – 67 ml	7	G	>5,000
	Delegate (S)	65-97 g	7	G	>5,000
	Coragen (D)	101 – 152 ml	14	A or G	>5,000
	Actara 240SC (N)	44.1 ml	7	A or G	
	Actara 25WG (N)	42.5 g	7	A or G	>5,000

Insect	Insecticide (and insecticide group[1])	Rate / Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Colorado potato beetle *continued*	Admire / Alias 240 SC / Grapple / Grapple$_2$ (N)	81 ml	7	G	4143-4870
	Assail (N)	16.2-32.4 g	7	G	1,064
	Clutch (N)	28-43 g	14	A or G	
	Pounce / Perm-UP (P) Ambush (P)	73 – 105 ml 57-81 ml	1	A or G	1276
	Decis 5EC (P)	40 – 60 ml	3	A or G	395
	Matador / Silencer (P)	34 – 50 ml	7	A or G	64-110
	Ripcord (P)	25 – 50 ml	7	A or G	242-542
	Up-Cyde (P)	57 ml	7	A or G	355
	Concept (N + P)	263 ml	7	G	
	Sevin XLR Plus (C)	0.50 L	7	A or G	649
	Vydate (C)	0.93-1.21 L	7	G	9-10
	Furadan[3](C)	0.222 L	7	G	7.34
	Malathion 500 (OP)	0.56-0.80 L	3	A or G	4302
	Malathion 85E (OP)	0.297-0.445 L	3	G	5,500
	Diazinon 50 W (OP)	0.445 kg	14	G	1960
	Diazinon 500E (OP)	0.445 L	14	G	1500
	Diazinon 50 EC (OP)	0.445 L	14	G	N/A
	Monitor (OP)	0.71-0.91 L	14	A or G	17
	Dibrom (OP)	0.44 L	4	A or G	345
	Imidan (OP)	0.91 kg	7	G	285
	Lorsban / Pyrinex / Nufos / Citadel (larvae only) (OP)	0.405 L	7	G	205 – 418
	Thionex 50W (OC)	0.45-0.61 kg	1	G	110
	Thionex EC (OC)	0.6-0.8 L	2	G	110
	Thiodan (OC)	0.6-0.8 L	1	G	107.2
Potato Flea Beetle	Admire SPT / Alias 240 SC / Grapple / Grapple$_2$ (N)	11.79 – 17.69 ml per 100 pounds (45.36 kg) of potato seed tubers	N/A	Seed Treatment	>4,870
	Titan (N)	10.4-20.8 ml per 100 kg potato seed pieces			2,000
	Admire 240 F / Alias 240 SC / Grapple / Grapple$_2$ (N)	Soil Application: 0.344-0.526 L (based on 90 cm row spacing).	N/A	G	4143-4870
	Pounce / Perm-UP (P) Ambush (P)	73 – 105 ml 57-81 ml	1	A or G	1276
	Decis 5EC (P)	40 – 60 ml	3	A or G	395
	Matador / Silencer (P)	34 ml	7	A or G	64-110
	Ripcord (P)	25 – 50 ml	7	A or G	242-542
	UP-Cyde (P)	57 ml	7	A or G	355
	Concept (N + P)	263 ml	7	G	
	Sevin XLR Plus (C)	0.50 L	7	A or G	649

Insect	Insecticide (and insecticide group[1])	Rate / Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Potato Flea Beetle *continued*	Lannate (C)	0.2185 kg	3	G	30-34
	Vydate (C)	0.93-1.21 L	7	G	9-10
	Furadan[3] (C)	0.222 L	7	G	7.34
	Diazinon 50 W (OP)	0.445 Kg	14	G	1960
	Diazinon 500E (OP)	0.445 L	14	G	1500
	Diazinon 50 EC (OP)	0.445 L	14	G	N/A
	Monitor (OP)	0.71-0.91 L	14	A or G	17
	Dibrom (OP)	0.44 L	4	A or G	345
	Imidan (OP)	0.91 kg	7	G	285
	Lorsban / Pyrixex / Nufos / Citadel (OP)	0.405 L	7	G	205 – 418
	Orthene (OP)	0.30-0.44 kg	21	G	1030-1447
	Thionex 50W (OC)	0.45-0.61 kg	1	G	110
	Thionex EC (OC)	0.6-0.8 L	1	G	110
	Thiodan (OC)	0.6-0.8 L	1	G	107.2
Variegated cutworm	Coragen (D)	101-152 ml	1	A or G	>5,000
	Pounce / Perm-UP (P) Ambush (P)	73 ml 57 ml	1	G	1276
	Ripcord (P)	70 ml	7	G	242-542
	Sevin XLR Plus (C)	0.1-0.125 L / 300 m of row	7	A or G	649
	Lannate (C)	0.11 -0.22 kg	3	G	30-34
Armyworm	Coragen (D)	101-152 ml	1	A or G	>5,000
	Matador / Silencer (P)	34 ml	7	A or G	64-110
Stem Borers					
European Corn Borer	Rimon (SB)	0.17-0.33 L	14	G	>5,000
	Entrust (S)	35.4 g / acre	7	G	>5,000
	Success (S)	59 ml	7	G	>5,000
	Delegate (S)	65 g	7	G	>5,000
	Coragen (D)	101 – 152 ml	1	A or G	>5,000
	Matador / Silencer (P)	34 ml	7	A or G	64-110
	Pounce / Perm-UP (P) Ambush (P)	73 ml 57 ml	1	A or G	1276
	Concept (N + P)	263 ml	7	G	
	Sevin XLR Plus (C)	1.01 – 2.59 L	7	A or G	649

*Before using any pesticide on potatoes, consult the list of **Agricultural Pesticides Approved for Use**, available from Simplot Canada and McCain Foods (Canada).

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: SB=substituted benzoylurea, S=spinosyns, HFB=Homopteran feeding blockers, D=diamides, N=neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates, OC=organochlorines.

[2] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

[3] The United States has revoked all carbofuran tolerances (residue limits in food). Caution should be used if producing potatoes for export.

Field Scouting in Rye

Information on typical damage, when and how to monitor, and economic thresholds for cutworms, aphids and armyworms in rye can be found in the section on field scouting in small grain cereals (wheat, barley, oats).

Rye Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Belowground and Surface Feeders					
Wireworms	Cruiser Maxx Cereals Seed Treatment (N)	325 ml per 100 kg of seed		Seed treatment	
	Cruiser Maxx Vibrance Cereals Seed Treatment	325 – 650 ml per 100 kg of seed		Seed treatment	
Cutworms (Army, black, darksided, pale western, red-backed, white)	Pounce / Perm-UP (P) Ambush (P)	73 – 158 ml 57-121 ml	Treat pior to 6 leaf stage	G	1030
Sap Feeders					
Aphids	Malathion 500 (OP)	0.60-0.80 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
Defoliators					
Grasshoppers	**Spreadable Bran Baits**				
	Nolo Bait	Minimum of 0.45 kg		A or G	
	Eco bran (C)	0.8-1.6 kg	14	G	N/A
	Sprays				
	Sevin XLR Plus (C)	0.50-1.01 L	14	A or G	649
	Malathion 500 (OP)	0.69 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Lagon /Cygon 480EC (OP)	0.22 L (nymphs) 0.34-0.41 L (adults)	2-28 (see labels)	A or G	60-450
True armyworm	Sevin XLR Plus (C)	1.01-2.12 L	14	A or G	649
	Malathion 500 (OP)	0.60-0.80 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: N=neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates.

[2] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Safflower Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Defoliators					
Grasshoppers	Lagon /Cygon 480 EC / Cygon 480-AG (OP)	0.22-0.40 L	21	A or G	60-450

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: OP=organophosphates.

[2] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Field Scouting in Small Grain Cereals (wheat, barley, oats)

BELOWGROUND AND SURFACE FEEDERS

Cutworms

Typical Damage: Notched, wilted, dead, or cut-off plants. Plants missing from rows, bare patches appearing in field.

When and How to Monitor: Look for cutworms, and evidence of cutworm feeding, when monitoring in late May to mid-July. Often cutworms will be close to the cut or shriveled plants they have just damaged. Cutworms will sometimes be most abundant in patches or a specific area of a field. In areas of the field where cutworm damage is noticeable, check around damaged plants in a 0.25 m^2 (50cm x 50cm) areas. Use trowel or shovel to carefully search through top half to 1 inch of soil for cutworm larvae. Multiply the number of cutworms found by 4 to get the number per m^2. Repeat in several locations to get an accurate assessment of what the cutworm levels are.

Economic Threshold: Pale western cutworm – 3-4/m^2; Redbacked and army cutworm – 5-6/m^2. Well established fall-seeded crops or spring seeded crops with good moisture conditions can tolerate higher numbers. Sometimes it is most economical to just treat infested patches, and not whole fields.

SAP FEEDERS

Aphids

Typical Damage: Visible wilting of plants, yellow patches in fields, plants are sticky.

When and How to Monitor: Look for aphids when monitoring prior to the soft dough stage. While monitoring the field, using a sweep net or tapping plants over a white tray or bucket can alert you to the presence and relative abundance of aphids. If aphid levels appear concerning, a more thorough examination is needed. Count aphids on 20 randomly selected stems in each of 5 areas. Counts should be at least 50 paces apart, and observations should be made well into the center of the field. Too frequently farmers become alarmed after checking a few plants along the margins, especially near shelterbelts, where populations are high. Record the total number of aphids and calculate the average per plant.

Economic Threshold: 12-15 aphids/stem prior to the soft dough stage.

Barley Thrips

When and How to Monitor: Sampling should begin when the flag leaf is first visible and continue until the head is completely emerged from the boot. Barley thrips exhibit an edge effect; there are usually more thrips near protected field margins than other areas of the field. Most thrips can be found under the top 2 leaf sheaths. Unroll the leaf sheaths away from the stem to find the thrips.

Economic Threshold: Insecticide treatments are only effective when applied before heading is complete.

Treat when thrips are equal to or greater than the number calculated by:

Threshold (Thrips/stem) = (Cost of Control ÷ expected $ value per bushel)/0.4

DEFOLIATORS

Grasshoppers

Typical Damage: Black strips along margins of newly emerging crops, head clipping later in season.

When and How to Monitor: Look for grasshoppers when monitoring fields from late – may through to harvest. Check along edges of crop, particularly areas adjacent to hayland, pastures and roadsides. Estimate number of hoppers/yard^2 (m^2).

Economic Threshold: 8-13 grasshoppers/m^2. Early in the season, when grasshoppers are small, 18 grasshoppers/m^2 and visible crop damage may be a more appropriate threshold.

A rough estimate for an economic threshold for grasshoppers in crops to be used as greenfeed has been suggested at 20 grasshoppers/m^2 or higher.

Armyworms

Typical Damage: Leaves stripped from plants, awns chewed from heads, heads clipped.

When and How to Monitor: Check the soil surface for armyworms, and the plants for feeding, when monitoring in mid-June through early-August. At each stop shake plants and carefully check soil surface for dislodged larvae. During the day larvae may be under plant trash, soil clods or in soil cracks. Check the backs of armyworms for parasite eggs.

Economic Threshold: Four unparasitized larvae, smaller than 2.5 cm (1 inch) per square foot. For migrating Armyworms: Treat a couple of swaths ahead of the infestation in the direction of movement to form a barrier strip.

SEED FEEDERS ONLY

Wheat Midge (wheat only)

When and How to Monitor: Monitor wheat in July when crop emerges from boot stage until flowering. Check crop canopy at dusk for signs of wheat midge adult activity. At each stop, examine 10 heads. Record the number of midge adults observed on or near heads. Calculate average number of midge per head.

Sticky traps may be used to capture adult midge activity in wheat fields.

Economic Threshold: For yield only: 1 adult midge per 4 to 5 heads. At this level of infestation, wheat yields will be reduced by approximately 15% if the midge is not controlled. *To maintain optimum grade:* 1 adult midge per 8 to 10 wheat heads during the susceptible stage.

Small Grain Cereals (wheat, barley, oats) Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[3]
Belowground and Surface Feeders					
Wireworms	Cruiser Maxx Cereals Seed Treatment (N)	325 ml per 100 kg of seed		Seed treatment	
	Cruiser Maxx Vibrance Cereals Seed Treatment	325 – 650 ml per 100 kg of seed		Seed treatment	
	Raxil WW (N)	A combination of Raxil MD and Stress Shield (imidacloprid).			
Cutworms (Army, dark sided, pale western, redbacked)	Decis 5EC (P)	80 ml	31 (oats) 40 (barley, wheat)	A or G	395
	Ricord (barley and wheat only) (P)	70 ml	21	G	242-542
	Pounce / Perm-UP (P) Ambush (P)	73 – 158 ml 57-121 ml	Treat prior to 6-leaf stage	G	1030
	Lorsban/Pyrinex/Nufos/Citadel (OP)	0.354-0.486 L	60	A or G	205-418
Sap and Fluid Feeders					
Aphids	Malathion 500 (OP)	0.60-0.8 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Cygon 480 EC /Cygon 480-AG (OP)	0.17 L	2	A or G	60-450
Thrips	Lannate (C)	0.1214kg	20	A or G	30-34
	Lagon /Cygon 480 EC /Cygon 480-AG (OP)	0.40 L	7-21 (see labels)	A or G	60-450
Brown Wheat Mite	Lorsban / Pyrinex / Nufos / Citadel(OP)	0.253 L	60	A or G	205 - 418

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[3]
Defoliators					
Grasshoppers	**Spreadable Bran Baits**				
	Nolo Bait	Minimum of 0.45 kg		A or G	
	Eco bran (C)	0.8-1.6kg	14 (oats, wheat) 28 (barley)	G	
	Sprays				
	Decis 5EC (P)	40 – 60 ml (ground) 60 ml (air)	31 (oats) 40 (wheat, barley)	A or G	395
	Ripcord (young grasshoppers only) (wheat and barley only) (P)	20 – 28 ml	30 (wheat) 45 (barley)	G	242-542
	Matador / Silencer (young grasshoppers only) (P)	25 – 34 ml (Ground) 34 ml (Aerial)	Do not apply within 28 days of harvest or 14 days of livestock foraging	A or G	64-110
	Sevin XLR Plus (C)	0.50-1.01 L	14 (wheat, oats) 28 (barley)	A or G	649
	Malathion 500 (OP)	0.68 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Lorsban / Pyrinex / Nufos / Citadel (OP)	0.235-0.354 L	60	A or G	205-418
	Lagon / Cygon 480EC (OP)	nymphs-0.22 L adults-0.34-0.40 L	2-28 (see labels)	A or G	60-450
Cereal Leaf Beetle	Malathion 500 (OP)	0.22 – 0.45 L	7	A or G	4302
	Malathion 85E (OP)	0.435 L	7	A or G	5,500
True Armyworm	Delegate (S)	40-81 g	21	G	>5,000
	Matador / Silencer (P)	34 ml	Do not apply within 28 days of harvest or 14 days of livestock foraging	A or G	64-110
	Sevin XLR Plus (C)	1.01-2.12 L	14 (wheat, oats) 28 (barley)	A or G	649
	Lannate (C)	0.1093-0.2185kg	20	A or G	30-34
	Malathion 500 (OP)	0.60-0.80 L	7	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Lorsban / Pyrinex / Nufos / Citadel (OP)	0.354 – 0.486 L	60	A or G	205-418
Slugs	Sluggo Professional	10-20 kg		G	>5,000

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[3]
Pests of Seed Only					
Wheat Midge (a pest of wheat only)	Rotate Crops – Continuous wheat cropping encourages higher wheat midge populations.				
	Resistant Varieties – the following varieties are resistant to feeding by wheat midge: Red spring wheat varieties: AC Goodeve, AC Unity, AC Fieldstar, AC Shaw, CDC Utmost, and AC Vesper. Extra-strong wheat variety: AC Glencross.				
	Lorsban/Pyrinex/Nufos/ Citadel (OP	0.336-0.405 L	60	A or G	205-418
	Lagon /Cygon 480 EC /Cygon 480-AG (OP)	0.40 L	21	A or G	60-450
Stem-Borers					
Hessian Fly	• Never plant wheat in the same field 2 years in a row in areas where Hessian flies are a problem. • The spring wheat cultivar Superb is partially resistant to the Hessian fly. • Early seeded spring wheat is less susceptible to stem breakage caused by Hessian fly than later seeded wheat. • Winter wheat planted in September will likely be free of Hessian flies.				
Wheat Stem Maggot	Crop rotation and stubble cultivation may reduce populations				
Wheat stem sawfly	Solid-stem wheat varieties (such as the hard red spring wheat varieties AC Lillian, AC Abbey and AC Eatonia) can reduce damage by wheat stem sawfly larvae compared to susceptible varieties, however the level of control can vary depending on environmental conditions.				

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: S=spinosyns, N= neonicotinoids, P=pyrethroids, C=carbamates, OP=organophosphates

[2] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Scouting for insects in **Soybeans**

Soybean Aphid

Typical Damage: Soybean aphids suck sap from soybean plants. Infested leaves may wilt or curl when infestations are large. Other symptoms may include plant stunting, reduced pod and seed count, and yellowing of leaves.

When and How to Monitor: Check 30 plants (6 plants in 5 areas) per field. Examine the entire plant and estimate populations of soybean aphids (counting exact numbers will not be possible or practical with higher populations). Once soybean aphid numbers reach 250 aphids per plant, scout the field frequently to determine if soybean aphid numbers are increasing. A population can stay at 250-300 aphids per plant and not cause economical yield loss. If the aphid levels are not rising above 250-300 per plant, there is a good indication that field conditions are favouring natural enemies (such as beneficial insects and fungi) that are helping control the aphids.

Economic Threshold: When there are on average at least 250 aphids per plant and the population is increasing, and the plants are in the R1 (beginning bloom) to R5 (beginning seed) growth stages, treatment would be economical. This threshold gives an approximate 7-day lead time before aphid populations are expected to exceed the economic injury level (670 aphids per plant), where cost of control is equal to yield loss. When soybean aphid populations are not actively increasing above 250 aphids per plant, natural enemies are keeping up with the aphid population. Do not use an insecticide in this case, as it will kill the natural enemies which may enable the aphid population to increase above the economic injury level.

Soybean Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[2]
Belowground and Surface Feeders					
Wireworms	Cruiser Maxx Vibrance Beans (N)	A seed treatment combining Cruiser Maxx Beans and Vibrance 500FS			
Seedcorn Maggot	Cruiser Maxx Vibrance Beans (N)	A seed treatment combining Cruiser Maxx Beans and Vibrance 500FS			
	Agrox CD, Agrox B-2 (OP)	See "Disease Control-Seed Treatments" section of this guide			N/A
	Diazinon 50W (OP)	20 g/300 mL water/4 L seed		Seed Treatment	1960
Cutworms	Matador /Silencer (P)	34 ml	21	A or G (Matador) G (Silencer)	64-110
Sap or Fluid Feeders					
Soybean Aphid	Cruiser Maxx Vibrance Beans (N)	A seed treatment combining Cruiser Maxx Beans and Vibrance 500FS			
	Movento	75–111 ml	21	A or G	>2,000
	Matador /Silencer (P)	34-94 ml (Matador) 34 ml (Silencer)	21	A or G (Matador) G (Silencer)	64-110
	Concept (N + P)	132 - 263 ml	20	G	
	Lagon /Cygon 480 EC /Cygon 480-AG (OP)	0.28-0.40 L	30	A or G (lagon, cygon 480 EC) G only (Cygon 480-AG)	60-450
Leafhoppers	Lagon /Cygon 480 EC /Cygon 480-AG (OP)	0.28-0.40 L	30	A or G (lagon, cygon 480 EC) G only (Cygon 480-AG)	60-450
Lygus bugs	Matador /Silencer (P)	34 ml	21	A or G (Matador) G (Silencer)	64-110
	Lagon /Cygon 480 EC /Cygon 480-AG (OP)	0.28-0.40 L	30	A or G (lagon, cygon 480 EC) G only (Cygon 480-AG)	60-450
Spider mites	Lagon /Cygon 480 EC /Cygon 480-AG (OP)	0.40 L	30	A or G (lagon, cygon 480 EC) G only (Cygon 480-AG)	60-450
Defoliators					
Grasshoppers	Matador /Silencer (P)	34 ml	21	A or G (Matador) G (Silencer)	64-110

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: N= neonicotinoids, P=pyrethroids, OP=organophosphates.

[2] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

Stored Grain Insect Control-

See Insect Control in Stored Grain; after Insect Management Charts (pages 479-482).

Summerfallow-

See grasshopper management on Pastures, etc.

Scouting for insects in Sunflowers

BELOWGROUND AND SURFACE FEEDERS

Cutworm

Typical Damage: Notched, wilted, dead, and cut-off plants (weed or crop seedlings). Plants missing from rows, bare patches appearing in field.

When and How to Monitor: Look for cutworms, and evidence of cutworm feeding, when monitoring sunflowers in late May to mid-July. Often cutworms will be close to the cut or shriveled plants that they have just damaged. Cutworms will sometimes be most abundant in patches or a specific area of a field. In areas of a field where cutworm damage is noticeable, check around damaged plants in a 0.25 m^2 (50cm x 50cm) areas. Use trowel or shovel to carefully search through top half to 1 inch of soil for cutworm larvae. Multiply the number of cutworms found by 4 to get the number per m^2. Repeat in several locations to get an accurate assessment of what the cutworm levels are.

Nominal Threshold: 1 cutworm or more per square foot (30 by 30 cm) or if there is a 25 to 30% stand reduction. Sometimes it is most economical to just treat infested patches, and not whole fields.

DEFOLIATORS

Sunflower Beetle

Typical Damage: Adults: Leaves of seedling plants chewed or completely destroyed late May through June, shot-holes or large areas of leaves chewed July through August. Larvae: Leaves of plants chewed or completely destroyed.

When and How to Monitor: Adults: Look for when monitoring sunflower seedlings in May through June. Examine 10 plants at random at each stop. Larvae: Look for when monitoring sunflowers in July through mid-August. Examine 10 plants at random at each sampling site. Peel back leaves around growing tip and record total number of larvae found. Calculate average number per plant.

Economic Threshold: Adults: 1-2/seedling; Larvae: 10 to 15/plant or 25-30% defoliation.

Insects affecting the seeds

PESTS OF SEED ONLY

Red Sunflower Seed Weevil

Typical Damage: Seeds partly or completely destroyed, exit hole in hull. Shriveled kernels, kernels completely destroyed.

When and How to Monitor: Monitor fields when ray petals being to form and continue every 2 to 3 days until pollination is complete. When scouting, use the X pattern and begin counts at least 70 to 100 feet into the field to avoid margin effects. Examine 5 plants at each site for a total of 25 plants. For checking individual sunflower heads, brush the face of the head vigorously to bring the weevils to the surface, or use a commercial preparation of mosquito repellent containing diethyl toluamide (DEET) to spray the heads. This will cause the weevils to move out of hiding spots. Record total number of weevils and calculate average per head.

Economic Threshold:

Confection Sunflowers: 1-2 weevils/plant. Control is based on a need to keep seed damage below 3 or 4% because of industry standards.

Oilseed sunflowers: 12-14 weevils/head.

The ideal plant stage to treat is when most plants in the field are at 40% pollen shed (R5.4).

Banded Sunflower Moth

When and How to Monitor: Look for banded sunflower moth adults when monitoring fields in the late bud (R-4) to early bloom (R5.1) plant growth stage. Count moths on 20 plants from 5 different sites for a total of 100 plants. Sampling in early evening or early morning when the moths are most active gives the most accurate counts.

Sampling strategies based on scouting for adult moths during daylight hours, and counting eggs, have also been developed.

Economic Threshold: 1 moth per 2 plants when monitoring in the early evening or early morning.

If monitoring for eggs or adult moths during daylight hours, tables for determining economic thresholds can be found at: http://www.ag.ndsu.edu/pubs/plantsci/pest/e823.pdf If treatment is warranted, it should be applied at the R5.1 sunflower plant growth stage.

Lygus bugs

Economic Threshold: Confection - One adult lygus bug per 9 heads can result in economic losses through the reduction in seed quality. Lygus bug management should be initiated between the R4 to R5.1 stage if adult densities reach economic levels. Oilseed sunflowers are not believed to be at risk of damage from lygus bugs.

Sunflowers Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Belowground and Surface Feeders					
Wireworms	Wireworms may sometimes damage sunflowers. Seeding sunflowers when the soil temperature is at least 8 to 10°C at 1 to 1.5 inches depth may minimize damage by wireworms.				
	Cruiser Maxx Sunflowers (N)	A seed treatment combining Cruiser 5FS with Maxim 480FS and Apron XL. Sunflower Seeds can not be treated with Cruiser Maxx Sunflowers in Canada.			
Cutworms	Pounce / Perm-UP (P) Ambush (P)	73 – 158 ml 57-121 ml	Treat prior to 6-leaf stage	G	1030
	Lorsban/Pyrinex/Nufos/ Citadel (OP)	0.486 L	42	G	205-418
Defoliators					
Sunflower Beetle	Cruiser Maxx Sunflowers (N)	A seed treatment combining Cruiser 5FS with Maxim 480FS and Apron XL. Sunflower Seeds can not be treated with Cruiser Maxx Sunflowers in Canada			
	Decis 5EC (P)	40 ml	70	A or G	395
	Matador /Silencer (P)	17– 25 ml(Ground) 34 ml (Aerial)	7	A or G	64-110
	Ripcord (P)	28 ml	70	A or G	242-542
	UP-Cyde (P)	40 ml	70	A or G	355
	Furadan[3] (C)	0.11 L	60	G	7.34
	Thionex EC (OC)	0.6 L	60	G	110
	Thiodan (OC)	0.6 L	60	G	107.2
Pests of Head and Seeds					
Lygus bugs	Matador	34 ml	7	A or G	64-110
Sunflower Seed Weevil	Early planting helps to reduce seed damage by sunflower seed weevils				
	Ripcord (P)	28 ml	70	A or G	242-542
	UP-Cyde (P)	40 ml	70	A or G	355
	Lorsban / Pyrinex / Nufos / Citadel (OP)	0.486 L	42	A or G	272/205
Banded sunflower moth	Late planting may provide some control				
Sunflower Moth	Dipel 2X DF (young larvae) (M)	127 – 253 g	N/A	A or G	> 4,000
Sunflower Midge	Some cultivars show some resistance to feeding by sunflower midge				

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: M=microbial, P=pyrethroids, C=carbamates, OP=organophosphates, OC=organochlorines.

[2] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

[3] The United States has revoked all carbofuran tolerances (residue limits in food). Caution should be used if producing sunflowers for export.

Field Scouting in Sweet Clover

DEFOLIATORS

Sweetclover Weevil

Typical Damage: Adults chew crescent-shaped and jagged notches in leaves and can completely defoliate plants.

When and How to Monitor: Inspect clover seedlings for weevil damage in spring as the seedlings emerge. In mid-summer and throughout August, inspect first-year clover stands for damage along crop margins. Invading weevils move into these stands only as far as necessary to satisfy their food requirements, so an insecticide application to affected field margins is usually all that is required. Visually estimating the number of weevils per plant must be done carefully because weevils fall from plants easily and are difficult to see on the ground.

Economic Threshold: 1st year stands: 1 weevil adult/3 seedlings (1/5 seedlings under dry conditions). 2nd year stands: 9-12 weevil adults/plant.

Sweet Clover Insect Management Chart

Insect	Insecticide (and insecticide group[1])	Rate/Acre	Preharvest interval (days)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Defoliators					
Grasshoppers	**Spreadable Bran Baits**				
	Eco bran (C)	0.8-1.6kg	2	G	N/A
	Sprays				
	Sevin XLR Plus (C)	0.50-1.01 L	2	A or G	649
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
Sweetclover Weevil	Locate new seedlings as far as possible from 2nd-year clover. Cultivating second-year stands of sweet clover silage and hay as soon as possible after the crop is taken kills the new- generation weevil larvae in the soil.				
	Malathion 500 (OP)	0.56-1.01 L	7-Cattle may be returned immediately after spraying.	A or G	4302
	Malathion 85E (OP)	0.445-0.544 L			5,500
	Lagon /Cygon 480 EC / Cygon 480-AG (OP)	0.34-0.45 L	28	A or G	60-450
Alfalfa weevil	Coragen (D) (suppression only)	152-202 ml	0	G	>5,000
Blister Beetle	Sevin XLR Plus (C)	1.01-1.6 L	2	A or G	649
Beet Webworm	Sevin XLR Plus (C)	1.01-2.12 L	2	A or G	649
Sap or Fluid Feeders					
Lygus Bugs	Dibrom (OP)	0.44-0.88 L	4	A or G	345
Leafhoppers	Sevin XLR Plus (C)	1.01-1.6 L	2	A or G	649
	Malathion 85E (OP)	0.445-0.544 L	7	A or G	5,500
	Dibrom (OP)	0.44-0.88 L	4	A or G	345
Aphids	Dibrom (OP)	0.44-0.88 L	4	A or G	345

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Insecticide Group: C=carbamates, OP=organophosphates.

[2] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Timothy-
See forage grasses

Wheat-
See small grain cereals

Insect Control in Stored Grain

Prevention

Clean in and around storage facilities. Grain storage facilities, and the area around storage facilities, should be cleaned thoroughly prior to storing grain.

Clean equipment used to move grain. Grain left in equipment throughout the summer months can result in new grain that is being placed into storage becoming infested. Combines, truck beds, grain wagons, augers and other equipment used to move grain should be cleaned of grain residue. Other potential sources of grain infesting insects include livestock feeds, old seed bags, spilled grain, etc.

Inspect grain storage facilities for signs of deterioration, especially for leaks or holes through which insects or rodents can gain access to the stored grain. Moving and storing the grain in clean facilities will eliminate one source of infestation. However, grain stored for long periods of time still has the potential for renewed infestations.

Treating storage facilities. Depending on the commodity to be stored, storage facilities may additionally be sprayed or dusted, if needed, with a recommended insecticide before storing grain in the bin (e.g. malathion, diatomaceous earth or cyfluthrin – refer to product labels for details). ***Note*** – some commodities, such as canola, flax and sunflowers, should not be stored in facilities recently treated with malathion or cyfluthrin (Tempo).

Dry and Cool Grain. Ideally, the grain should be dry before being put into storage, and cooled as quickly as possible. For long-term storage, producers are urged to lower the grain temperature below 15°C as soon as possible after the grain is placed in storage. At 15°C the stored product insects stop laying eggs and development stops. Aeration systems used during the night immediately after harvest should have the grain below 15°C in about 2 weeks. Grain that is not moved or aerated after harvest can remain warm enough to allow insects to survive the winter. Convection currents arising from this warm air can also promote condensation, sprouting (heating) and mould growth in unmanaged grain. These conditions are very attractive to stored product pests and support their development.

Once the grain mass is cooled to the desired temperature, fans should be sealed to prevent unwanted air migration through the mass that could result in early grain mass warm-up. Cold grain has a longer storage life than warm grain.

Note however that under cool grain temperatures , insect movement is reduced to the point that some insecticides may not be effective.

Monitoring for Insects

Regular monitoring of the stored grain is the next step in determining the presence and potential for serious infestations. Either the presence of insects or damaged kernels will give an indication of a problem. One means of detecting insects in stored grain is through the use of probe traps, available from numerous crop protection agents. Often the first indication of an infestation will be found near the top centre of a storage bin, and therefore, this is where traps should be placed. Monitoring should take place once every 7-10 days during the onset of storage (first 60 days) and then the frequency of monitoring may be adjusted.

Identifying insects in stored grain

Correct identification of insects found in stored grain is important in determining the most appropriate control methods. Some of the insects found in stored grain feed on the grains, while others feed on fungus that may be developing in the stored grain.

Grain feeders:

Insects that feed on the grain include rusty grain beetles, red flour beetles, and sawtoothed grain beetles.

The **rusty grain beetle** is the most common stored product insect. Heavy infestations of this insect cause grain to heat and spoil.

The **red flour beetle** is the another common insect pest of stored grain in the prairies. Red flour beetles cannot feed on undamaged, dry seed with less than 12% moisture content. They prefer grain dust, broken grain and milled stocks. Red flour beetles can be controlled by moving grain, whether or not it is cold.

Sawtoothed grain beetles are more common in stored oats than in stored wheat and barley.

Fungus feeders:

Insects that feed on fungus in the grain bin include the foreign grain beetle, hairy fungus beetle, psocids, and grain mites.

Foreign grain beetles resemble the rusty grain beetle, but can be distinguished from it by club-shaped antennae. Also, when placed in a glass jar, foreign grain beetles will climb up the sides, while rusty grain beetles cannot. While foreign grain beetle is considered a fungus feeder, they will feed on grain if the moisture content is in the high end of the acceptable range (eg. 14.5% mc wheat).

Grain mites are whitish, about 0.2 to 0.5 mm long, and can be hard to see with the naked eye. About eight kinds of mites are common in farm granaries and elevators.

Psocids are soft-bodied insects, about 1 mm long, with long antennae relative to the body size.

Fungus feeding insects and mites cannot survive in dry grain. Chemical control is not necessary for fungus feeding pests in stored grain. Practices that result in the grain drying may be all that is needed to control such pests.

Information to help identify insect pests of stored grain can be found at: **http://www.gov.mb.ca/agriculture/crops/cropproduction/faa06s00.html**

Control Techniques:

The Canada Grain Act states there is zero tolerance for any primary insects (those that feed on whole, sound grain) in grain delivered to elevators. Outlined below are some control techniques and when and how these techniques can be best used.

Cold Temperatures

Rusty grain beetles are cold hardy and can survive subzero temperatures. Rusty grain beetles and other stored grain insects can be killed by reducing core grain temperatures as follows:

Time Required to Kill Insects at Various Grain Temperatures

Grain Temperature	Time required to kill insects
-5°C	12 weeks
-10°C	8 weeks
-15°C	4 weeks
-20°C	1 week

Cooling the grain, through aeration or moving the grain several times during mid-winter, should provide effective control of rusty grain beetles.

High Temperatures

All four stages of insects (eggs, larvae, pupae and adults) will die if subjected to high temperatures for a sufficient period of time. The most realistic use of high temperatures for controlling insects would be when the grain was tough and in need of drying. In this case, the insects would be killed at the same time the grain is dried. The insects need to be exposed to temperatures in the range of 50 to 55°C for approximately 15 minutes. Note – the baking quality of wheat is damaged if the temperature of the grain reaches 60°C for any significant length of time.

Moving Grain

Moving grain using cyclone-based pneumatic conveyors (grain vacs) at about 200 bushels per hour has been shown to be an effective means of controlling insects in stored grain. Loading the grain using a pneumatic grain conveyor removes insects from grain being delivered to elevators.

Phostoxin

Company: Degesch America Inc. (Phostoxin); PCP#15736 (Round tablets).

Formulation: 55% aluminum phosphide.

Formulation	Primary Use	Container Size
Phostoxin tablets (3g each)	On the farm or country elevator	500 tablets
Phostoxin pellets (0.6g each)	In terminals	2500 pellets
Phostoxin tablets prepac	Containers	4 strips of 33 tablets to a pouch

Insects and other pests controlled: Rusty grain beetle, red flour beetle, sawtoothed grain beetle, granary weevil, Indian meal moth, yellow mealworm, lesser grain borer, nematodes, mice and rodents.

Approved for use on the following stored grains: Barley, corn, dried peas, lentils, millet, oats, rye, soybeans, sunflower seeds, triticale and wheat.

Restricted Product: The use and sale of Aluminum Phosphide (Phostoxin) is restricted to licensed pesticide applicators possessing a valid fumigation licence (Saskatchewan) or stored agricultural products license (Manitoba).

Phostoxin can only be used in conjunction with a detailed fumigation management plan.

Rate and Minimum Exposure Period: Refer to labels to determine rate. For grain bins a dosage of 250-500 tablets (or 880-2560 pellets) per 100m^3 of bin space being treated (not volume of grain) is recommended. It is important to ensure that bins are relatively secure. It is not advisable to use phosphine products in bins that are leaky or not well sealed.

The following table may be used as a guide to determine the minimum length of exposure period to phostoxin at the indicated temperatures:

Temperature	Exposure Period
Below 5°C (40°F)	Do not fumigate
5°C-12°C (40°-53°F)	10 days
13°-15°C (54°-59°F)	5 days
16°-20°C (60°-68°F)	4 days
above 20°C (68°F)	3 days

If the grain is less than 5°C then the tablets will not release the gas until the grain temperature warms up. This may result in poor control and accidental exposure to phostoxin at a later date in grain handling facilities. Very dry grain will also slow the release of the gas from the pellets. A shortened exposure period cannot be compensated for by increased dosage. Also ensure that storage is well ventilated for at least 24 hours after the required time for fumigation.

Protect-It, Insecto

Company: Hedley Technologies Ltd. (Protect-It) PCP#24259; Natural Insecto Products Inc. (Insecto) PCP#22489

Formulation: 90 percent Diatomaceous Earth (DE)

Insects controlled: Rusty grain beetle (Protect-It only), rice weevil, granary weevil, Angoumois grain moth, Mediterranean flour moth, Indian meal moth, red flour beetle and Tribolium.

Approved for use on the following stored products: Feed grains, seed, stored grains, wheat, barley, buckwheat, corn, oats, rye, flax, peas, soybeans and sorghum. Also registered for structural treatment of empty grain storage and transportation containers.

How it works: Diatomaceous earth damages the cuticle of the insect, reducing the insect's ability to retain moisture. The insect eventually dies from dehydration.

Rate, for empty storage structures: Use a dust blower or aeration fan to get diatomaceous earth into the cracks, crevices and void spaces of the structure being treated. Dust areas at a rate of 1 kg per 200 square metres (5 g/m^2).

Rate, while grain is being placed into storage: Protect-It; The application rate for Protect-It varies by crop and insect species, ranging from 100 g/tonne for control of rusty grain beetle in wheat to 1000 g/tonne for red flour beetle in corn. Refer to the label for details.

Insecto; Apply to grain at the time of storage at a rate of 0.5 to 1 Kg per metric ton of grain (500-1000 ppm).

Precautions: The application of DE will lower the test weight measurement of the grain, but usually not to the point of downgrading. If test weight loss is excessive, the grain can be diluted with untreated grain. DE is non-toxic to humans and animals.

Malathion Grain Dust

Company: Interprovincial Co-operative (Malathion Grain Protectant Dust) PCP#17222; United Agri Products (Malathion Grain Protector Dust) PCP# 15896

Formulation: 2% malathion

Insects controlled: confused flour beetles, flat grain beetles, granary weevil, Indian meal moth, lesser grain borer, rusty grain beetle and sawtoothed grain beetle.

Approved for use on the following stored grains: Wheat, rye, barley and oats as stored grains.

Malathion Grain Dust can be applied to grain as it is being loaded into a bin or being turned by adding gradually at the grain auger. It can also be used to control surface infestations by applying to the grain surface and raking in to 15 cm depth of the grain. Malathion controls insects by ingestion and contact and insects must be active for it to be effective.

Rate:

Crop	Rate-g/1000 kg (tonne) grain
Wheat	415
Rye	450
Barley	520
Oats	735

Do not apply to grain within 7 days of sale.

Be aware that the Canadian Grain Commission allows only 8 ppm of malathion residues in stored grains.

Malathion 500, Malathion 85E

Refer to labels for these products for insect and mite control in *empty* grain bins, grain elevators, grain box cars and flour mills.

Note – Some commodities, such as canola, should not be stored in facilities recently treated with malathion.

Malathion 500 (IPCO)

Insect	Rate	Note
Rusty grain beetle, sawtoothed grain beetle, confused flour beetle, grain mite, granary weevil, Indian meal moth, lesser grain borer (empty grain bins)	250-300 ml/5 L of water on 100 m^2	May be used within 1 day of grain storage

Malathion 85E (United Agri Products),

Insect	Rate	Note
Rusty grain beetle, red flour beetle, sawtoothed grain beetle, confused flour beetle, grain mite, granary weevil, Indian meal moth, lesser grain borer, flat grain beetles, rice weevils (empty grain storage facilities)	Mix 490 ml in 15 L of water. Apply 5 L of mixture on 100 m^2	Wait until spray has thoroughly dried before storing grain in treated areas.

Tempo 20 WP

Company: Bayer CropScience PCP#25673

Formulation: 20% cyfluthrin. Tempo is a group 3 (pyrethroid) insecticide.

Application: Tempo can be used to control insects in grain storage facilities, truck beds and other areas where grain is stored *before filling these areas with grain.* Cleaning of all areas prior to use of Tempo 20 WP insecticide will increase levels of control. See the insecticide label for specific mixing instructions.

Insecticide Product Pages

For rates and preharvest intervals for insecticides, see the insect management charts on pp. 442-477.

Actara

Insecticide Group – 4A
(Refer to page 441)

Company:

Syngenta

Formulation:

Actara 240SC (PCP#28407): 240 g/L thiamethoxam formulated as a soluble concentrate.

Container size - 2 X 2.04 L

Actara 25WG (PCP#28408): 25% thiamethoxam formulated as a water dispersible granule.

Container size - 4 X 850 g

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Colorado potato beetle, aphids, potato leafhopper

Application:

Actara 240SC - Soil application: Apply as an in-furrow spray during planting to allow the insecticide to be absorbed by plant roots. For 90 cm row spacing, apply 151 to 196 mL/acre. Use the higher rate for extended control. DO NOT follow a soil application with a foliar application.

Potato seed piece treatment: Choose the appropriate rate from the chart on label, based on seeding rate. Apply only in areas with adequate ventilation or in areas that are equipped to remove mist or dust. Best results are obtained if potatoes are planted immediately after *Actara 240SC* is applied to seed. When transporting cut and treated seed ensure the seed is covered. DO NOT apply a subsequent treatment of in-furrow or foliar application of thiamethoxam or other Group 4 insecticide following seed piece treatment with *Actara 240SC*.

Foliar application: *Actara* may be applied by ground or air. For ground application use a minimum of 40 L / ac unless otherwise indicated on label. A maximum of 2 foliar applications of *Actara* may be made per season. DO NOT exceed a total of 88 g/acre. Allow at least 7 days between applications. DO NOT use a foliar application of *Actara* following in-furrow or soil application of *Actara*.

How it Works:

Actara is a systemic (taken up into the plant foliage after application), chloronicotinyl insecticide.

Restrictions:

Rainfastness:

Avoid application of this product when heavy rain is forecast. Actara is rainfast once spray has dried on treated plants.

Preharvest Interval:

DO NOT harvest within 7 days of application.

Re-Entry:

DO NOT re-enter treated areas for 12 hours after foliar application.

Re-cropping: No restrictions following the harvest of sorghum, wheat, barley, canola, potatoes or cover crops. For all other crops 120 day plant-back interval is required.

Tank mix: Potatoes - *Actara 240SC* can be mixed with *Quadris® Flowable* fungicide and *Ridomil® Gold 480SL* fungicide (or *Ridomil Gold 480EC* fungicide).

Buffer Zones: Buffer zones are required for the protection of terrestrial and freshwater habitats. Refer to specific label for buffer zones required.

Precautions:

Actara is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Wait a minimum of 5 days after treatment before placing beehives in a treated field.

Hazard Rating:

Actara 240SC: Caution – Poison
Actara 25WG: Caution – Eye and skin irritant

For an explanation of the symbols used here see page 11.

Assail

Insecticide Group – 4A
(Refer to page 441)

Company:

E.I. duPont Canada (PCP#27128)

Formulation:

Acetamiprid formulated as a wettable powder-70% by weight

Insects Controlled and Registered Crops:

CROP	INSECT
Alfalfa (seed production only)	Alfalfa plant bug, Lygus bugs (suppression only)
Potato	Colorado potato beetle, aphids

Application:

Ground application only. DO NOT apply by air

Apply with a minimum finished spray volume of 80 litres per acre. For best results uniform spray coverage of the host plants is important.

Begin application when insect levels reach economic thresholds. Use higher rates for heavy infestations, dense foliage or for adult stages of the Colorado potato beetle. Residual control will depend on environmental factors, plant growth, application rate and level of insect infestation.

How it Works:

Assail is a chloronicotinyl insecticide that works by contact or ingestion. It has an anti-feedant effect that can prevent pest damage to host plants prior to the death of the insect. This product rapidly degrades in the soil with no carryover effects.

Restrictions:

DO NOT make more than 2 applications per year per crop.

DO NOT apply more than once every 7 days.

DO NOT exceed a total of 48 g active ingredient (68.8 g product) per acre per season.

DO NOT apply less than 7 days prior to harvest (Preharvest interval).

Buffer Zones: An untreated buffer zone between the last spray swath and the edge of aquatic systems (such as rivers, streams, lakes, and other water bodies) must be established. For groundboom sprayers - 20 metres. DO NOT apply acetamiprid directly to water or to areas where surface water is present. Buffer zone required for sensitive terrestrial areas (grasslands, forested areas, shelterbelts, woodlots, hedgerow, rangelands) – 2 metres.

Re-entry Interval: DO NOT re-enter treated areas for a period of 12 hours after application.

Precautions:

DO NOT apply when honey bees are present in the area to be treated as acetamiprid is toxic to honey bees if exposed to direct treatment.

If this product is to be applied to a product destined for export to the United States, information on acceptable residue levels are available at www.croplife.ca.

Storage: DO NOT store in or around the home. Store unused product in a cool, ventilated, dry, locked area. DO NOT allow prolonged storage in areas where temperatures frequently exceed 46 degrees C.

Hazard Rating:

☠ Warning – Poison

For an explanation of the symbols used here see page 11.

Beleaf

Insecticide Group – 9C
(Refer to page 441)

Company:

FMC Corporation (PCP#29796)
(Distributed by United Agri Products)

Formulation:

50% flonicamid formulated as a water soluble granule

Container size - 1 to 100 kg

Insects Controlled and Registered Crops:

CROP	INSECT
Alfalfa (seed production only)	Aphids
Potato	Aphids

Application:

DO NOT apply by air.

Ensure the spray system is clean and free of residues from previous applications. Fill the tank half full with clean water. Ensure agitation system is operating and sufficient to provide uniform spray mixing during application and until the spray tank has been emptied. Complete filling to the desired solution volume.

Thorough spray coverage of plant foliage is essential for optimum control. Apply in sufficient water volumes to ensure good coverage - Use a minimum of 38 litres per acre of water. Rates and finished spray volumes should be increased under extreme pest populations or dense plant foliage.

Scout fields and reapply if necessary.

How it Works:

Flonicamid insecticide is a member of the pyridinecarboxamide class of chemistry and controls target pests by contact and ingestion provoking rapid and irreversible feeding cessation.

Restrictions:

Allow a minimum of 7 days between applications.

DO NOT make more than 3 applications per year.

DO NOT apply more than apply more than 64 grams per acre of *Beleaf* per application.

DO NOT apply more than 192 grams per acre of *Beleaf* per season.

DO NOT use *Beleaf* in greenhouses or home gardens.

Re-cropping: There are no plant-back restrictions for potatoes. All other crops may be planted 30 days after the last application of *Beleaf*.

Precautions:

Avoid overnight storage of spray mixture. Prepare only enough spray mixture required for immediate application.

DO NOT use liquid fertilizer as a carrier for *Beleaf* insecticide.

Beleaf insecticide should not be used with spray adjuvants.

Avoid application when heavy rain is forecast.

DO NOT enter or allow entry into treated areas for 12 hours after application.

Storage: Store product in original container, in a secured, dry place separate from other pesticides, fertilizer, food or feed.

Flonicamid is toxic to beneficial insects. Minimize spray drift to reduce harmful effects on beneficial insects in habitats next to the application site. Flonicamid is toxic to non-target terrestrial plants. Observe buffer zones for sensitive areas (e.g. aquatic habitats, forested areas) as specified on label directions.

If this product is to be applied to a commodity destined for export to the United States, visit Crop Life Canada's website www.croplife.ca for information on acceptable residue limits.

Hazard Rating:

▽ Caution – Eye irritant

For an explanation of the symbols used here see page 11.

Chlorpyrifos

Insecticide Group – 1B
(Refer to page 441)

Company:

Dow AgroSciences (*Lorsban 4E* – PCP#14879)
MANA Canada (*Pyrinex 480EC* – PCP#23705;
United Agri Products (*Pyrifos 15G* – PCP#24648)
Cheminova Inc. (*Nufos 4E* – PCP#25831)
IPCO (*Citadel 480EC* – PCP#27479)

Different trade names refer to different companies. Note that products may have different label recommendations. Check your label for more information.

Formulations:

Citadel, Nufos, Lorsban and *Pyrinex* - 480 g/L chlorpyrifos formulated as an emulsifiable concentrate. Container sizes-10 L jug, 115 L returnable container, 208 L drum.

Pyrifos - 15% chlorpyrifos formulated as a granule

Insects Controlled and Registered Crops:

CROP	INSECT
Barley, Oats, Wheat	Army, dark sided, pale western and redbacked cutworms, armyworms, grasshoppers
Wheat only	Russian wheat aphid, brown wheat mite, wheat midge
Canola	Dark-sided, redbacked, variegated, pale western, and army cutworms; bertha army worm, alfalfa looper, armyworm, diamondback moth larvae, grasshoppers, lygus bug
Flax	Dark-sided, redbacked, variegated, pale western, and army cutworms, armyworm, bertha armyworm
Lentils	Pale western cutworm, grasshoppers
Sunflowers	Redbacked, pale western and army cutworms, sunflower seed weevil (except for *Pyrinex* and *Citadel*)
Corn	Dark sided, black and redbacked cutworms
Potato	Wireworms (in-furrow at planting - Pyrinex and Pyrifos only), Colorado potato beetle (larvae), potato flea beetle, tarnished plant bug, red-backed cutworm, black cutworm, darksided cutworm

Application:

Chlorpyrifos may be applied by air or ground equipment **except** for the following. Ground application only for red-backed cutworm control in corn and sunflower. Ground application only for potatoes.

Pyrifos 15G may be applied by ground only and is to be applied in furrow at planting. Refer to label for specific rates with respect to row spacing.

Uniform coverage of the crop is essential in aerial applications. Apply when insects exceed economic threshold levels and use sufficient water for good coverage. Use higher rates for heavy infestations, mature insects, heavy crop canopy, or under dry soil conditions.

How it Works:

Chlorpyrifos is a broad spectrum, non-systemic insecticide and works by contact, ingestion and vapour action (inhalation).

Effects of Weather:

Avoid application under hot temperatures. Best results will be obtained for wheat midge and cutworms when application is made in evening (after 7 p.m.) or morning (before 8 a.m.). DO NOT apply to plants under extreme drought stress or crop injury may occur.

Tank mixes:

Citadel, Lorsban, Nufos and *Pyrinex* may be tank mixed with the following herbicides:

Avenge 200-C
Banvel II plus 2,4-D amine
Buctril M
Logic M (*Citadel* only)
MCPA ester and amine
2,4-D amine and ester

When tank mixing always add the herbicide to the spray tank, then add *Citadel, Nufos* or *Lorsban*. If *Citadel, Nufos* or *Lorsban* are added first, settling out may occur causing plugging of lines or nozzles.

Lorsban 4E can be mixed with *Folicur 432 F*. If mixing always add *Folicur 432 F* to the spray tank first and then add *Lorsban 4E*. DO NOT add any surfactants.

Restrictions:

Grazing: Treated cereals grown for cover crop should not be used for human or animal consumption if treated within

60 days of harvest.

Storage: Combustible. DO NOT store near heat or flame. DO NOT store with food, feed, drugs or clothing.

Wheat, barley, oats, canola, corn, flax, lentil, sunflower, potatoes - DO NOT make more than 1 application per season.

Buffer zones around sensitive areas: For all aerial applications, a buffer zone of 100 metres is required for the protection of aquatic habitats.

Precautions:

Chlorpyrifos has a high acute mammalian toxicity. Very toxic to bees, fish, birds, aquatic organisms and other wildlife. May be fatal if swallowed. Causes substantial but temporary eye injury. Harmful if absorbed through skin. May cause skin or eye irritation. Wear protective clothing, impervious gloves and goggles. Wash thoroughly with soap and water after handling and applying. Immediately remove contaminated clothing and wash before re-use. DO NOT apply or allow to drift on to workers or other persons.

DO NOT apply directly to water or where runoff could occur to adjacent aquatic sites. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Avoid use when bees are actively foraging.

Hazard Rating:

☠ Danger – Poison

For an explanation of the symbols used here see page 11.

Clutch

Insecticide Group – 4A
(Refer to page 441)

Company:

Valent Canada Inc. – PCP#29382

Formulation:

50% clothianidin formulated as a water dispersible granule

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Colorado potato beetle, aphids, leafhoppers

Application:

In furrow application: Apply as a narrow band in-furrow at planting. For best results, direct spray on the seed pieces or seed potatoes. Use sufficient water volume to ensure uniform coverage and optimal uptake. Use higher rate when extended control is needed. DO NOT apply *Clutch* more than once per season as an in furrow treatment.

Foliar application: May be applied by air or ground. Maximum of 3 foliar applications may be made per crop per season. Application intervals must be at least 10 days apart and must be rotated with an insecticide from a different chemical family. Use sufficient water volume to ensure uniform coverage. Use higher rate when insect populations are high.

How it Works:

Clothianidin is in the neonicotinoid class of insecticides and works by contact or ingestion, with systemic properties that provide residual control. Residual control will depend on environmental factors, plant growth, dosage rate and level of insect infestation.

Restrictions:

DO NOT follow a soil or in furrow application of *Clutch* with a foliar application of *Clutch* or any Group 4 or 4A insecticide.

DO NOT make a foliar application of *Clutch* following a seed piece treatment or in furrow application of *Clutch*, any product containing clothianidin or other neonicotinoid class (Group 4 or 4A) insecticides.

Re-cropping: Acceptable plant-back intervals for:

canola, corn, potato - no restrictions;
soybeans - 30 days.

Precautions:

Clothianidin is persistent and may carry over. It is recommended that any products containing clothianidin not be used in areas treated with this product during the previous season.

Avoid application when heavy rain is forecast.

DO NOT enter or allow entry into treated areas for 12 hours after application.

DO NOT graze treated fields or feed treated forage or hay to livestock.

Storage: DO NOT store in or around the home. Store unused product in a cool, ventilated, dry, secure area, away from food and feed.

DO NOT use treated seed pieces for food, feed or fodder.

Clothianidin is highly toxic to bees. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area.

Clothianidin is toxic to beneficial insects, aquatic organisms, birds, small wild mammals and non- target terrestrial plants. Observe buffer zones for sensitive areas (e.g. aquatic habitats, forested areas) as specified on label directions.

DO NOT use this chemical where groundwater contamination can occur, especially in areas where soils are permeable (e.g. sandy) and / or the water table is shallow.

If this product is to be applied to a commodity destined for export to the United States, visit Crop Life Canada's website www.croplife.ca for information on acceptable residue limits.

Hazard Rating:

☠ Caution – Poison

– Eye irritant

For an explanation of the symbols used here see page 11.

Concept

Insecticide Group – 3A, 4A

(Refer to page 441)

Company:

Bayer CropScience Inc. (PCP#29611)

Formulation:

75 g/L imidacloprid and 10 g/L deltamethrin formulated as a suspension concentrate

Container size - 5.26 L jug

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Colorado potato beetle, aphids, leafhoppers, potato flea beetle, tarnished plant bugs, European corn borer (suppression only)
Soybean	Soybean aphid

Application:

Ground application only.

Apply when target pest has reached economic threshold levels. Repeat application if pest populations reach economic thresholds.

Use sufficient water volumes for thorough coverage (i.e. minimum of 40 – 80 litres of water per acre)

For control of tarnished plant bug it is recommended to use *Concept* insecticide only when timing of application coincides with the timing for another pest on the label for potatoes.

How it Works:

Concept insecticide works through contact and systemic activity. Insecticide components: Imidacloprid is a chloronicotinyl, systemic (within the plant) insecticide that works by contact or ingestion. Deltamethrin is a non-systemic pyrethroid insecticide that works through contact and ingestion.

Restrictions:

Allow a minimum of 5 days between applications.

DO NOT make more than 3 applications of *Concept* in a year.

DO NOT apply *Concept* through any type of irrigation equipment.

DO NOT apply *Concept* following a seed treatment or soil application of any Group 4 (neonicotinoid class) insecticide.

A buffer zone of 8 metres is required between the downwind point of application and the closest edge of aquatic habitats.

Re-cropping: Treated areas may be replanted with any crop specified on an imidacloprid label, or any crop for which a tolerance exists for the active ingredient, as soon as practical following the last application.

Acceptable plant-back intervals for:

Cereal grains (wheat, barley, oats) – 30 days

Pea and bean (including fababean, soybean and dry common bean) – 9 months

All other food and feed crops – 12 months

Green manure and other cover crops not intended for human or animal consumption - no plant-back interval required following treatment.

DO NOT graze or harvest cover crops for food or feed.

Precautions:

DO NOT enter or allow entry into treated areas for a period of 24 hours after application of *Concept*.

Concept is highly toxic to fish and other aquatic organisms. DO NOT allow spray drift to come in contact with lakes, streams, rivers, ponds or other aquatic areas including marshes, ponds, ditches, streams, lakes, etc. DO NOT apply *Concept* where runoff is likely to occur and be hazardous to aquatic organisms in neighboring areas.

DO NOT apply *Concept* within 15 metres of well-heads or aquatic systems. DO NOT mix, load or clean equipment within 30 metres of well-heads or aquatic systems.

This product is highly toxic to bees exposed to direct treatment or residues on flowering crops or weeds. DO NOT apply this product or allow it to drift to flowering crops or weeds if bees are visiting the treatment area.

If this product is to be applied to a commodity destined for export to the United States, visit Crop Life Canada's website www.croplife.ca for information on acceptable residue limits.

Storage: DO NOT use or store in or around the home. Store unused product away from feeds, seeds, fertilizer, plants and foodstuffs.

Concept cannot be stored below freezing.

If stored for one year or longer, shake well before using.

Hazard Rating:

Warning – Eye Irritant

☠ deltamethrin: Danger – Poison

☠ imidacloprid: Caution – Poison

For an explanation of the symbols used here see page 11.

Coragen

Insecticide Group – 28
(Refer to page 441)

Company:

E.I. duPont Canada (PCP#28982)

Formulation:

200 g/L chlorantraniliprole formulated as a suspension.

Container sizes - 3.79 L

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Armyworm, Colorado potato beetle, corn earworm, European corn borer, fall armyworm, variegated cutworm
Corn	Armyworm, fall armyworm, black cutworm, variegated cutworm, corn earworm, European corn borer
Alfalfa, sweet clover	Alfalfa weevil (suppression only)
Forage (grass) seed	Armyworms
Bean	Cutworms, European corn borer
Chickpea, lentil, pea	Armyworms, cabbage looper, corn earworm, cutworms, European corn borer

Application:

May be applied by air or ground equipment on potatoes.

Begin application when treatment thresholds have been reached. Thorough coverage is essential for optimal control.

Use the high rate under heavy pest pressure and/or when larger larvae are present.

Spray Volume for Potatoes: Apply in a minimum finished spray volume of 40 L/acre by ground. Apply in a minimum finished spray volume of 20 L/acre by air.

How it Works:

Coragen disrupts muscle activity in the insects, resulting in paralysis. Treated pests stop feeding quickly after ingestion, become lethargic and lose mobility.

Restrictions:

DO NOT make more than 4 applications per season on alfalfa (seed production), bean, chickpea, lentil, pea, potatoes, corn, and forage seed.

DO NOT make more than 1 application per cutting on alfalfa and sweet clover.

Potatoes, bean, chickpea, lentil, pea – DO NOT apply more than once every 3 days. Corn – DO NOT apply more than once every 7 days. Alfalfa, bean, chickpea, corn, lentil, potato, sweet clover, and forage seed. – DO NOT exceed a total of 455 ml of *Coragen* per acre per season.

Forage (grass) seed – Seed production only. DO NOT feed forage, fodder or hay to livestock.

Re-Entry Interval: 12 hours.

Storage: Store product in original container only, away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Keep container closed.

Precautions:

Toxic to aquatic organisms. Observe buffer zones specified on the label.

The use of this chemical may result in contamination of groundwater, particularly in areas where soil is permeable (e.g. sandy soil) and/or the depth to the water table is shallow.

To reduce runoff from treated areas into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil, or clay.

Avoid application when heavy rain is forecast.

DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Hazard Rating:

Very low toxicity to mammals.

Keep out of reach of children.

Cypermethrin

Insecticide Group – 3A
(Refer to page 441)

Company:

Engage Agro corporation (*Ripcord Insecticide* – PCP#30316)
United Phosphorous, Inc. (*UP-Cyde 2.5 EC* – PCP#28795)

Formulation:

cypermethrin formulated as an emulsifiable concentrate. (*Ripcord Insecticide* – 407 g/L; *UP-Cyde 2.5 EC* – 250 g/L)

Container size - 1L

Insects Controlled and Registered Crops:

CROP	INSECT
Wheat, barley (Ripcord only)	Grasshoppers, cutworms
Canola, rapeseed, mustard	Grasshopper (*Ripcord* only), flea beetle, bertha armyworm
Roadsides, headlands, summerfallow	Grasshopper (*Ripcord* only)
Sunflower	Cutworm (*Ripcord* only), sunflower beetle, sunflower seed weevil
Corn	European corn borer, cutworms (*Ripcord* only), corn earworm (*Ripcord* only)
Potato	Colorado potato beetle, flea beetle, leafhopper, tarnished plant bug, cutworms (*Ripcord* only)

Application:

Ripcord may be applied by ground application only for control of grasshoppers on wheat, barley, roadsides, headlands and canola; for flea beetle control on canola; and for control of cutworms.

Ripcord may be applied by ground or air for bertha armyworm, sunflower beetle, sunflower seed weevil, corn earworm, European corn borer and Colorado potato beetle, flea beetle, leafhoppers and tarnished plant bug on potatoes. Only 1 aerial application is permitted per season for bertha armyworm on canola and sunflower beetle and seed weevil on sunflower, and 2 applications per season for corn and potatoes.

UP-Cyde may be applied by ground or air in corn, potatoes, canola, rapeseed, sunflower

Observe a 16 yard (15 m) buffer zone from water bodies and other sensitive areas when applying cypermethrin with ground application. Observe a 110 yard (100 m) buffer zone from water bodies and sensitive areas when applying by air.

Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage. Use higher rates for mature insect stages (grasshoppers) or severe infestations.

How it Works:

Ripcord and *UP-Cyde* are pyrethroid insecticides that work as a contact and stomach poison.

Effects of Weather:

Activity of *Ripcord* on grasshoppers is reduced as soil temperature increases. Application for grasshopper control should be made at temperatures below 25°C. Spraying for grasshoppers should be delayed until evening if daytime temperatures are above 25°C.

Avoid application of *UP-Cyde* when temperatures exceed 27°C

Restrictions:

Grazing: Treated crops must not be grazed or cut for hay.

Storage: Keep in original container during storage. DO NOT contaminate or store near foodstuffs.

Precautions:

Cypermethrin is of low to moderate acute mammalian toxicity and very toxic to bees, fish, and aquatic organisms. Harmful or fatal if swallowed. May be harmful if absorbed through skin.

Severely irritating to eyes. Causes skin irritation and sensitization. Wear longsleeved protective clothing and gloves when handling or applying. Wear face shield or goggles when mixing. DO NOT apply where streams, lakes and ponds may be contaminated. Avoid spraying when bees are foraging.

Hazard Rating:

☠ Caution – Poison

For an explanation of the symbols used here see page 11.

Decis

Insecticide Group – 3A
(Refer to page 441)

Company:

Bayer CropScience (PCP#17734)

Formulations:

50 g/L deltamethrin formulated as an emulsifiable concentrate.

Container sizes: *Decis 5EC* - 2.4 L and 9.6 L jugs

Insects Controlled and Registered Crops:

CROPS	INSECT
Alfalfa (seed crops only)	Lygus bug, alfalfa weevil
Field corn	European corn borer
Potato	Colorado potato beetle, potato flea beetle, Lygus bugs, leafhopper
Canola, rapeseed, mustard (condiment and oilseed quality *Brassica juncea* varieties)	Flea beetles, clover cutworm, bertha armyworm, diamondback moth, beet webworm, cabbage seedpod weevil (adults only), Lygus bugs, grasshoppers (canola only)
Sunflower	Sunflower beetle
Wheat, barley, oats, lentils	Cutworms, grasshoppers
Rangeland, pastures, roadside, fence row	Grasshoppers
Flax	Cutworms, beet webworm, grasshoppers
Red clover (seed production only)	Lesser clover leaf weevil (suppression only)

Application:

Decis may be applied by air or ground equipment to all crops with the exception of alfalfa, red clover and corn, which require ground application only. Apply when insects exceed economic threshold numbers with sufficient water for good coverage. Use higher rates for severe infestations, on dense foliage or when a number of insect growth stages are present.

Alfalfa (seed production) - Use higher rates if alfalfa weevil present.

Tank Mixes:

When in a tank-mix the spray mixture must be constantly agitated throughout application. Do not allow the spray mixture to stand in the spray tank for more than 4 hours after mixing.

Decis may be tank mixed with the following herbicides: *Pardner, Buctril M, Banvel, MCPA, 2,4-D, Puma*^{120} *Super*. Tank mixes with *Puma*^{120}*Super* or *Puma*^{120}*Super plus Buctril M* are for use in spring and durum wheat only.

Bayer CropScience also supports the following mixes that are not on the *Decis* label. Apply mixes according to the most restrictive use limitations for either product:

Herbicides – Glyphosate, *Odyssey* and *Solo*

Fungicides – *Headline, Lance, Tilt*

When a tank mix is used the labels of the tank mix partners are to be consulted.

How it Works:

Decis is a non-systemic, synthetic pyrethroid which works by contact and ingestion.

Effects of Weather:

DO NOT spray under a strong temperature inversion, or when temperature exceeds 25°C as this will result in a reduction in control. Best control will be achieved when *Decis* is applied during cooler periods of the day. DO NOT apply within 1 hour of rain.

Restrictions:

Alfalfa seed production – DO NOT apply more than once per year.

Canola – May be applied by ground or air. DO NOT apply more than once per season.

Corn – DO NOT apply more than 3 times per year

Potato – (Ground) DO NOT apply more than 3 times per year. (Aerial) DO NOT apply more than 2 times per year. May be used only once per season on high organic (muck) soils.

Red clover – DO NOT apply by air. DO NOT make more than 2 applications per year. DO NOT use treated crop for feed or forage. Restricted entry interval – 12 hours

Wheat, barley, oats, flax, lentil – (Ground) DO NOT apply more than 3 times per year. (Aerial) DO NOT apply more than 2 times per year.

Storage: DO NOT store below freezing. DO NOT store near feed, food, seeds or fertilizer. Keep away from heat, sparks and open flames. If stored for 1 year or longer, shake well before using.

Others: Ground application - Observe a 16 yard (15 m) buffer zone from environmentally sensitive areas (for example, wetlands, sloughs, rivers, houses, farm buildings).

Aerial application – Leave a 110 yard (100m) buffer zone. DO NOT apply *Decis* by air when the wind speed exceeds 8 kph. In soils with high organic content (muck soils), *Decis 5 EC* should be applied only once during each crop year, prior to August 1, and at rates of no more than 80 mL/acre.

Precautions:

Decis is of high mammalian toxicity and is a severe eye and skin irritant. Avoid contacting or breathing spray mist. This product contains petroleum distillates which are moderately to highly toxic to aquatic organisms and fish. *Decis* is toxic to bees and other beneficial insects. Avoid spraying when bees are foraging. Wear protective clothing, including goggles and respirator, when handling or spraying. DO NOT contaminate or store near feed or foodstuffs. Wash thoroughly after using *Decis*.

Hazard Rating:

☠ Danger – Poison

For an explanation of the symbols used here see page 11.

Delegate

Insecticide Group – 5
(Refer to page 441)

Company:

Dow AgroSciences (PCP# 28778)

Formulations:

25% spinetoram formulated as wettable granules.

Container size - 840 g

Insects Controlled and Registered Crops:

CROP	RATE (g per acre)	INSECT
Potato*	65 to 97	Colorado potato beetle (time for egg hatch or small larvae)
	65	European corn borer (time to coincide with peak egg hatch)
Wheat, barley, oats, rye**	40 to 81	Armyworm (when economic thresholds dictate)

* Maximum 3 applications per year with a minimum retreatment interval of 7 days

** Maximum 3 applications per year with a minimum retreatment interval of 5 days

Application:

Apply by ground only in sufficient water volume to cover the entire plant using a combination of nozzles and pressure designed to deliver thorough, even coverage with ***ASABE fine classification*** droplets. DO NOT apply through irrigation systems.

How it Works:

Delegate is derived from the fermentation of the bacterium *Saccharopolyspora spinosa*, which is then chemically modified to create the active ingredient. Spinetoram affects the insect nervous system. It does not interact with the known binding sites of other classes of insecticides. It works through ingestion or contact with the target insects. Target insects cease feeding within a few minutes, although death may take a few days.

Tank Mixes:

DO NOT mix this product with any other pesticide or fertilizer.

Restrictions:

Re-entry: DO NOT enter treated field for 12 hours.

Preharvest: DO NOT harvest within 21 days of application for wheat (spring and durum) or within 7 days for potato.

Grazing: No restrictions indicated.

Aerial Application: DO NOT apply by air.

Storage: Store in a cool, dry place. Keep from freezing.

Precautions: Delegate is toxic to bees, small wild mammals, aquatic organisms and non-target terrestrial plants, and may be toxic to certain beneficial insects exposed to direct treatment, drift or residues on flowering crops or weeds. DO NOT apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees, and other beneficial insects or small mammals in habitats next to the application site such as hedgerows and woodlands.

Buffer Zones:

Application method	Buffer Zones (metres†) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground *	10	5	1

See the key to product pages on page 27 for an explanation of the different habitats.

* Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Tank Cleaning:

Refer to page 15.

Hazard Rating:

No specific hazard rating specified.

For an explanation of the symbols used here see page 11.

Diazinon

Insecticide Group – 1B
(Refer to page 441)

Company:

United Agri Products (*Diazinon 500E* – PCP#11889; *Diazinon 50W* – PCP#19576)

IPCO (*Diazinon 50 EC* – PCP#27538)

Formulations:

Diazinon 500E – 50% diazinon formulated as a liquid. Container size - 4 L, 10L

Diazinon 50 EC – 50% diazinon formulated as an emulsifiable concentrate. Container size - 10 L

Diazinon 50W – 50% diazinon formulated as a wettable powder. Container size - 2 kg

Different trade names refer to different companies. Note that products may have different label registrations and recommendations. Check the label for more information.

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Aphids, flea beetles, Colorado potato beetles, leafhoppers
Corn, pea, bean	Seedcorn maggot
Bean (field)	Aphids, leafhoppers
Rangeland, pasture, ditch banks, roadsides, fence rows, wasteland	Grasshoppers

Application:

Apply diazinon by ground only.

How it Works:

Diazinon is an organophosphate insecticide with systemic and contact activity.

Effects of Weather:

Diazinon 50 EC, 500E and *50W* work most effectively if the temperature is 20°C or more or when temperatures will reach or exceed this minimum.

Restrictions:

Beneficial insects: Avoid spraying open flowers. Highly toxic to bees exposed to direct treatment or to residues on crops.

Environment: DO NOT contaminate any body of water, waterway or water source. Toxic to birds, fish, and wildlife, including waterfowl.

Precautions:

May be fatal if swallowed. Avoid contact with skin and inhalation of spray mist. Wear an approved respirator. Wash thoroughly after handling and before eating, drinking and smoking.

Hazard Rating:

☠ Danger – Poison

For an explanation of the symbols used here see page 11.

Dibrom

Insecticide Group – 1B

(Refer to page 441)

Company:

United Agri Products (PCP#7442)

Formulations:

864 g/L naled formulated as an emulsifiable concentrate.

Container size - 4 x 3.78 L jugs per case and 2 x 9.46 L jugs per case

Insects Controlled and Registered Crops:

CROP	INSECT
Alfalfa, clover, vetch	Aphids, loopers, leafhoppers, Lygus bugs
Beans	Alfalfa looper, aphids, spider mites
Potatoes	Flea beetles, Colorado potato beetles, leafhoppers
Rangeland, field areas and pastures.	Grasshoppers

Application:

Apply *Dibrom* by ground or air. Use designated amounts in full volumes of water. For ground application use 40-120 L of water per acre. For aerial use 4.4-8.8 L of water per acre unless otherwise stated.

How it Works:

Dibrom is an organophosphate insecticide. It acts as a contact and stomach poison.

Effects of Weather:

DO NOT apply *Dibrom* when air temperature is greater than 32°C.

Restrictions:

Environment: DO NOT contaminate any body of water, waterway or water source. *Dibrom* is moderately to highly toxic to birds, aquatic animals and other wildlife.

Re-entry interval: DO NOT enter or allow worker re-entry into treated area for 48 hours following application.

Precautions:

Concentrate may cause skin damage. DO NOT get on skin, eyes or clothing. Use waterproof gloves and face shield or goggles when handling concentrate. Harmful if swallowed. Avoid breathing spray mist.

Avoid contamination of feed, foodstuffs and drinking water.

Highly toxic to bees. Avoid application during periods of bee activity.

Hazard Rating:

☠ Danger – Poison

For an explanation of the symbols used here see page 11.

Dimethoate

Insecticide Group – 1B
(Refer to page 441)

Company:

IPCO (*Cygon 480 EC* – PCP#9807)

Cheminova (*Cygon 480-Ag* – PCP#25651)

United Agri Products (*Lagon 480E* – PCP#9382)

Different trade names refer to different companies. Note that products may have different label recommendations. Check your label for more information.

Formulations:

Cygon/Lagon - 480 g/L dimethoate formulated as an emulsifiable concentrate. Container size - 10 L.

Insects Controlled and Registered Crops:

CROP	*Cygon 480-Ag* INSECT	*Lagon 480E* INSECT	*Cygon 480 EC* INSECT
Peas		Aphids	Aphids
Potatoes (ground application only)	Aphids, leafhoppers	Aphids, leafhoppers, Lygus bugs	Aphids leafhoppers, Lygus bugs
Alfalfa *(rates vary for seed and forage production)	Aphids, leafhoppers, Lygus bugs*, plant bugs*, alfalfa blotch leaf miner, grasshoppers, reduction of alfalfa weevil larvae	Aphids, leafhoppers, alfalfa blotch leafminers, grasshoppers, reduction of alfalfa weevil larvae, Lygus bugs*, plant bugs*	Aphids, blotch leafminer, grasshoppers, leafhoppers, Lygus bugs,*plant bugs*, sweet clover weevil, reduction of alfalfa weevil larvae
Canaryseed	Aphids	Aphids	Aphids
Canola/rapeseed	Aphids, leafhoppers, grasshoppers,	Aphids, leafhoppers, grasshoppers,	Aphids, leafhoppers, grasshoppers,
Forage crops	Lygus bugs, plant bugs, grasshoppers	Grasshoppers, aphids (suppression only of Russian wheat aphid)	Aphids, grasshoppers, leafhoppers, Lygus bugs, plant bugs, reduction of alfalfa weevil larvae
Sweet clover, red clover, alsike clover	Sweet clover weevil	Sweet clover weevil	Sweet clover weevil
Pastures, waste areas	Grasshoppers	Grasshoppers	Grasshoppers
Wheat	Wheat midge, thrips, aphids (suppression only of Russian wheat aphid)	Thrips, grasshoppers, wheat midge, Russian wheat aphid	Wheat midge, aphids, thrips, grasshoppers
Barley, oats	Thrips, aphids (suppression only of Russian wheat aphid)	Thrips, grasshoppers,	Aphids, thrips, grasshoppers
Flax	Aphids	Aphids	Aphids

CROP	*Cygon 480-Ag* INSECT	*Lagon 480E* INSECT	*Cygon 480 EC* INSECT
Rye			Grasshoppers
Soybeans		Aphids, leafhoppers, Lygus bugs, spider mites	Aphids, leafhoppers, Lygus bugs, spider mites

Application:

May be applied by air or ground equipment (unless otherwise specified above). Apply when insects exceed economic threshold numbers and use sufficient water for good coverage. Use higher rates for adult insects, heavy infestations or dense canopy.

How it Works:

Dimethoate is a broad spectrum, systemic (within the plant) and contact, organophosphate insecticide and acaricide.

Restrictions:

Grazing: Remove cattle prior to spraying. Read label carefully to determine livestock re-entry period.

Storage: Store at temperatures between 4°C and 30°C and in areas away from feed and food.

Others: DO NOT treat when bees are foraging. DO NOT apply to alfalfa in bloom. Read label carefully to determine maximum number of applications per season. Wait at least 10 days before placing leafcutter bees in treated fields.

Precautions:

Dimethoate is of high acute mammalian toxicity and is highly toxic to birds, bees and other animals. Wear a respirator, goggles, rubber gloves, rubber boots and coveralls when handling concentrate. Avoid contact with skin and eyes. DO NOT inhale spray mist.

Hazard Rating:

Warning Poison – *Lagon, Cygon 480 AG*

Danger Poison – *Cygon 480 EC*

For an explanation of the symbols used here see page 11.

Dipel 2X DF

Insecticide Group – 11
(Refer to page 441)

Company:

Valent BioSciences (PCP#26508)

Formulation:

Bacillus thuringiensis var. Kurstaki strain ABTS-351 fermentation solids, spores and insecticidal toxins - 57.0%

Potency: 32,000 Cabbage Looper Units (CLU) per mg (32 billion CLU per Kg)

Insects Controlled and Registered Crops:

CROP	INSECT
Sunflower	Sunflower moth
Timothy	Essex (European) skipper
Corn	European corn borer larvae
Potato	Cabbage loopers

Application:

Treat when larvae are young (early instars) before the crop is damaged. A spreader sticker such as *Triton B1956* should be used to give thorough foliage coverage.

How it Works:

Dipel is a biological stomach insecticide resulting in the larvae ceasing to eat in a few hours, with death usually occurring within 1-3 days.

Restrictions:

Storage: Store at temperatures between 0° and 25°C (cooler temperatures preferable).

Others: DO NOT allow dilute spray to stand in tank for more than 12 hours. Use product within 24 months of date of manufacture if stored at cool temperatures. Final spray solution for *Dipel* should have a pH of 5-7.

Precautions:

Harmful if swallowed, inhaled, or absorbed through the skin. Avoid breathing dust or spray mist. Avoid contact with skin, eyes, or clothing. In case of contact with eyes or skin, immediately flush eyes or skin with plenty of water.

Hazard Rating:

Warning contains the allergen soy

⚠ Caution – eye irritant, skin irritant, potential sensitize

Eco Bran

Insecticide Group – 1A
(Refer to page 441)

Company:

Peacock Industries (PCP#25815)

Formulation:

Wheat bran infused with carbaryl insecticide.

Container size - 20 kg bag; 1kg bottle

Insects Controlled and Registered Crops:

CROP	INSECT
Alfalfa, beans, clover, corn, oats, rye, wheat, barley, canola, pastures, rangelands, forage grasses, field borders, headlands, rights-of-way, roadsides, wastelands	Grasshoppers

Preharvest Intervals and Livestock Re-entry Periods:

Crop	Preharvest Interval/ Livestock re-entry period
Corn	1
Alfalfa, clover	2
Beans	5
Oats, rye, wheat	14
Barley	28
Canola	Treat only seedlings
Field borders, headlands, rights-of-way, roadsides, wastelands	0
Entry of beef cattle or other livestock to pastures, rangelands or forage grasses	1
Entry of dairy cattle to pastures or rangelands, harvest of forage crops	2

Application:

For ground application only. DO NOT apply by air.

Broadcast application may be made with spreaders, hand applicators, or by hand. Use gloves and wash thoroughly following application. More information on application and applicators can be found at: http://www.grasshoppercontrol.com

Restrictions:

DO NOT apply within 50m of sloughs, ponds, streams, dugouts or open water. Apply when winds are between 3-8 kph and do not favour drift.

Presence of product on flowering crops such as alfalfa and clover will not harm foraging honey or leafcutter bees.

May be used in pastures while beef cattle are grazing.

Precautions:

Harmful if inhaled or swallowed. Avoid breathing dust or vapour from bait. Use only in well-ventilated areas. May cause eye irritation. Avoid contact with eyes and skin. Wash thoroughly after handling and before eating or smoking. Avoid contamination of feed and foodstuffs. Keep away from heat, sparks and open flame.

Endosulfan

Insecticide Group – 2A
(Refer to page 441)

Company:

Bayer CropScience (*Thiodan 4EC* – PCP#15747)

United Agri Products (*Thionex 50WP* – PCP#15333; *Thionex EC* – PCP#23453)

Different trade names refer to different companies. Note that products may have different label recommendations. Check your label for more information.

Formulation:

Thiodan / Thionex - *400* g/L endosulfan formulated as an emulsifiable concentrate. Container size - 10 L

Thionex 50WP - 50% endosulfan formulated as a wettable powder. Container size - 1 kg.

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Aphid, Colorado potato beetle, flea beetle, leafhopper
Sunflower (Thiodan 4EC and Thionex EC only)	Sunflower beetle
Bean	Aphids, potato leafhoppers, green clover worm (Thiodan only)
Corn (Thiodan 4EC and Thionex EC only)	Corn leaf aphid, corn earworm
Alfalfa, clover	Meadow spittlebug

Application:

Ground application only. Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage.

How it Works:

Endosulfan is an organochlorine insecticide that works as a contact and stomach poison.

Tank Mixes:

Compatible with most commonly used insecticides and fungicides, except Bordeaux mixture and hydrated lime.

Restrictions:

Grazing: DO NOT feed treated crop residue to livestock.

Storage: DO NOT store below freezing. If stored one year or longer, shake well before using.

Others: On sunflowers, DO NOT make more than 1 application per season.

Precautions:

Endosulfan is of high, acute mammalian toxicity and is toxic to bees. Highly toxic to fish. Hazardous if swallowed, inhaled or absorbed through the skin. Wear synthetic rubber gloves and approved respirator in prolonged spray-mixing and loading operations. DO NOT apply or allow spray drift to areas occupied by unprotected persons and animals or onto streams, lakes or ponds.

Hazard Rating:

☠ Danger – Poison

For an explanation of the symbols used here see page 11.

Entrust 80 W

Insecticide Group – 5
(Refer to page 441)

Company:

Dow AgroSciences (PCP#27825)

Formulation:

80% spinosad

Container size - 4 x 113.4 g packets

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Colorado potato beetle larvae and European corn borer larvae

Application:

Apply *Entrust 80 W* as a foliar spray by ground only. Apply when scouting indicates the target pest species have reached economic threshold levels. For Colorado potato beetle larvae, target eggs at hatch or small larvae. For control of European corn borer, time the application to coincide with peak egg hatch. Use higher application rate for higher pest pressure or when extended egg hatch is anticipated. If pest populations persist, a repeat application 7 to 10 days after the initial application may be necessary.

How it works:

Entrust 80 W is in the spinosine class of insecticides. It is a contact and stomach insecticide. It is derived from the fermentation of *Saccharpolyspora spinosa.*

Effects of weather:

This product has the potential for run-off. Do not spray immediately after a rainfall or if rain is forecast within 48 hours after application.

Restrictions:

Storage: Avoid freezing. DO NOT store or ship with food, feeds, drugs or clothing.

Others: DO NOT make more than 2 applications per season (maximum of 60 g/acre).

Precautions:

Entrust 80 W is highly toxic to honey bees exposed to direct spray. Avoid spraying on crops in bloom or other vegetation when bees are actively foraging. This product is toxic to other beneficial parasites and predators. DO NOT contaminate aquatic habitats such as ponds, lakes, rivers, streams and wetlands during application or when rinsing equipment and containers.

Buffer Zones: A buffer zone of 2 metres (early season) or 1 metre (late season) is required between downwind edge of spray boom and sensitive aquatic habitats.

Avoid contact with eyes, skin, and clothing.

DO NOT enter or allow worker entry into treated areas for a period of 12 hours after application.

Hazard Rating:

☠ Caution – Poison

For an explanation of the symbols used here see page 11.

Fulfill

Insecticide Group – 9B
(Refer to page 441)

Company:

Syngenta Canada (PCP # 27274)

Formulation:

50% pymetrozine formulated as a wettable granule
Container size – 6 X 780 g

Insects Controlled and Registered Crop:

CROP	INSECT
Potatoes	Aphids including: green peach, potato, foxglove, buckthorn

Application:

May be applied by ground or air. Apply *Fulfill* to plant foliage. Thorough spray coverage is essential for best performance. Apply *Fulfill* with sufficient water (minimum of 40 L/acre) to ensure good coverage of all plant surfaces. Higher water volumes will generally result in better coverage, especially under adverse conditions (hot, dry), where a dense plant canopy exists and/or aphid infestations are high. One additional application may be needed to control persistent aphid populations. Allow a minimum of 7 days between applications.

DO NOT apply *Fulfill* insecticide through chemigation.

DO NOT use in nurseries or in plant propagation houses, or on any plants grown for use as transplants.

The use of a non-ionic adjuvant is recommended to improve the performance of *Fulfill* insecticide under drought stress conditions.

How it Works:

Fulfill is a systemic insecticide and works primarily by ingestion and but has some contact activity. Affected aphids stop feeding shortly after exposure, but may remain on the plant foliage until they die, which is usually within 2-4 days. *Fulfill* insecticide has residual activity in the plant and will control aphids that move onto the plant after spraying.

Fulfill has shown no phytotoxicity on the varieties of potato tested when applied at the label rates.

Effects of Weather:

Fulfill insecticide exhibits movement through the leaf surface into plant tissue and is rainfast as soon as the spray solution has dried.

Restrictions:

Storage: Store in a cool, dry, place away from food, drinks, and animal feeding stuffs. Keep in the original container tightly closed.

Others: DO NOT apply by air. DO NOT exceed 2 applications (152 g product/acre) per crop per season. DO NOT apply directly to aquatic systems, permanent water bodies or areas where surface water is present. DO NOT contaminate water when cleaning equipment or disposing of equipment wash water.

A re-cropping restriction of 30 days is required for all crops.

Precautions:

May cause skin sensitization reactions. Applicators and other handlers must wear personal protective equipment including, long-sleeved shirt, long pants, waterproof gloves and shoes plus socks. DO NOT enter or allow entry into treated areas for 12 hours. DO NOT use, pour, spill, or store near heat or open flame.

Hazard Rating:

☠ Caution – Poison

For an explanation of the symbols used here see page 11.

Furadan

Insecticide Group – 1A
(Refer to page 441)

Company:

Bayer CropScience PCP#10828

Distributed by NuFarm Agriculture Inc.

Formulations:

480 g/L carbofuran formulated as a flowable.

Container sizes: *Furadan 480F* - 4 L jug

Insects Controlled and Registered Crops:

FURADAN 480F

(NOTE: Due to restrictions on residue limits for Furadan *in the United States, this product may not be suitable for use in commodities destined for export to the U.S.)*

CROP	INSECT
Potatoes	Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug
Corn	European corn borer
Sunflower	Sunflower beetle
Canola, mustard	Flea beetle, red turnip beetle

Application:

Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage (minimum 40 L per acre).

How it Works:

Furadan is a broad spectrum, carbamate insecticide, acaricide and nematicide.

Effects of Weather:

Avoid spraying when winds are more than 15 km/hr or less than 5 km/hr. When conditions are hot and dry, set up equipment to produce larger droplets to reduce evaporation effects.

Tank Mixes:

Furadan is compatible with fungicides commonly used on the same crops. DO NOT mix with Bordeaux and hydrated lime.

Restrictions:

Storage: DO NOT store below 2°C. Store separately from food and feed.

Aerial restrictions: DO NOT apply by air on potatoes or sunflowers. DO NOT spray fields of corn smaller than 12.5 acres (5 ha) by air.

DO NOT apply *Furadan* to areas where bees are actively foraging or near apiaries. DO NOT spray sunflowers after plants are more than 24 inches (60 cm) in height or after heads have started to form. The use of *Furadan* may be hazardous to burrowing owls. DO NOT apply within 270 yards (250 m) of known burrowing owl nests. DO NOT make more than 2 applications per season to potatoes, corn, and sunflower.

Precautions:

Of high acute mammalian toxicity. Highly toxic to bees, waterfowl, birds, fish and other wildlife. Poisonous by swallowing or inhalation. DO NOT breathe spray mist. DO NOT get in eyes. Wear goggles at all times. Use an approved respirator. DO NOT re-enter fields less than 48 hours following application, unless appropriate protective clothing is worn. (i.e. long-sleeved shirt and long pants).

Hazard Rating:

☠ Danger – Poison

For an explanation of the symbols used here see page 11.

Imidacloprid

Insecticide Group – 4A
(Refer to page 441)

Company:

Bayer CropScience (*Admire 240* – PCP#24094; *Admire SPT* – PCP#27702)

Cheminova (*Grapple* – PCP#28726 / *Grapple*$_2$ – PCP#29048)

MANA Canada (*Alias 240 SC* – PCP#28475)

Formulation:

240 g/L imidacloprid formulated as a suspension concentrate.

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Colorado potato beetle, aphids, potato leafhopper, potato flea beetle

Application:

Soil application: (*Admire 240 / Alias 240 SC / Grapple / Grapple*$_2$) Apply as a narrow band in-furrow. For best results, direct spray on the seed pieces in the furrow. Scout potato fields frequently, especially during warmer part of growing season. If pest populations exceed economic thresholds apply a recommended foliar insecticide with a different mode of action than imidacloprid.

Seed piece treatment: (*Admire SPT / Admire 240 / Alias 240 SC / Grapple / Grapple*$_2$) Refer to Imidacloprid in the seed treatments product pages.

Foliar application: (*Admire 240 / Alias 240 SC / Grapple / Grapple*$_2$) Apply only if insect populations exceed recommended economic thresholds. For optimum control, good coverage of the foliage is needed. A maximum of 2 foliar applications may be made per crop per season. Scout fields and retreat if needed. For aphids, two applications at least seven days apart may be required to achieve control. DO NOT make a foliar application following a soil or seed treatment of the product in the same crop. Allow at least 7 days after the last application and before harvesting the crop.

How it Works:

Imidacloprid is a chloronicotinyl, systemic (within the plant) insecticide that works by contact or ingestion. Control period may vary due to climate and soil conditions

Restrictions:

DO NOT apply more than once per season as a soil application.

DO NOT follow a soil application with a foliar application.

Re-cropping: Acceptable plant-back intervals for:

Cereal grains (wheat, barley, oats) - minimum 30 days

Peas and beans - 9 months

All other food and feed crops - 12 months

Green manure and other cover crops can be grown without plant-back intervals but cannot be grazed or harvested for food or feed.

DO NOT apply in fields where imidacloprid has been used during the previous season.

DO NOT apply through any irrigation system.

Precautions:

DO NOT re-enter treated areas for 24 hours after foliar application.

Avoid application when heavy rain is forecast.

DO NOT apply product or plant treated seed pieces within 15 metres of well-heads or aquatic systems, including marshes, ponds, ditches, reservoirs, streams, lakes, etc.

DO NOT mix, load or clean spray equipment within 30 metres of well-heads or freshwater habitats.

For application with air-blast equipment, DO NOT apply within 40 metres of well-heads or aquatic systems.

The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and / or where the water table is shallow.

Storage: DO NOT store in or around the home. Store unused product in a cool, ventilated, dry, locked area and avoid cross-contamination with other pesticides, fertilizers, food and feed.

DO NOT use treated seed pieces for food, feed or fodder.

Imidacloprid is highly toxic to bees exposed to direct treatment or residues on flowering crops or weeds.

Highly toxic to aquatic invertebrates and birds.

If this product is to be applied to a product destined for export to the United States, contact 1-866-375-4648 or www.croplife.ca.

Hazard Rating:

▽ Caution – Poison

For an explanation of the symbols used here see page 11.

Imidan

Insecticide Group – 1B
(Refer to page 441)

Company:

Gowan Canada (PCP#23006)

Formulation:

50% phosmet formulated as a wettable powder in water soluble sachets.

Insects Controlled and Registered Crops:

CROP	INSECT
Alfalfa	Alfalfa weevil, alfalfa blotch leafminer
Potato	Colorado potato beetle, potato flea beetle, potato leafhopper, potato aphid

Application:

Apply by ground only.

Imidan 50-WP instapak is packaged in water soluble sachets that are to be dropped into the spray tank unopened. DO NOT use in low-volume, gear-type spray equipment.

How it Works:

Imidan is an organophosphate insecticide.

Restrictions:

Storage: Keep sachets dry and DO NOT allow sachets to contact any moist surface prior to adding to spray tank. Keep water soluble sachets in the protective container and store in a cool, dry place. DO NOT store at temperatures above 40°C.

Precautions:

Harmful if swallowed, inhaled or absorbed through the skin. Wear protective clothing, including rubber gloves and goggles, during mixing, loading and spraying.

Imidan is toxic to fish and bees. Keep away from any body of water.

Hazard Rating:

☠ Danger – Poison

For an explanation of the symbols used here see page 11.

Lambda-cyhalothrin

Insecticide Group – 3A
(Refer to page 441)

Company:

Syngenta Canada. (*Matador* – PCP#24984)
MANA Canada (*Silencer 120 EC* – PCP#29052)

Formulations:

120g/L lambda-cyhalothrin formulated as an emulsifiable concentrate Container size - 4 x 3.78 L.

Insects Controlled and Registered Crops:

CROP	INSECT
Potatoes	Colorado potato beetle, European corn borer, Lygus bugs, potato flea beetle, potato leafhopper, tuber flea beetle, armyworm
Canola, mustard	Crucifer flea beetle, grasshoppers, Lygus bug, cabbage seedpod weevil (adults), cabbage looper, diamondback moth larvae, imported cabbageworm, bertha armyworm, swede midge
Sunflower	Sunflower beetle
Wheat, barley, oats	Grasshoppers, armyworm
Alfalfa, unimproved pasture	Grasshoppers
Summerfallow (Matador only)	Grasshoppers
Flax	Grasshoppers
Alfalfa Matador – Ground or Air Silencer – Ground only	Alfalfa weevil, Lygus bugs, pea aphid, potato leafhopper
Corn	European corn borer, corn earworm, cutworms, fall armyworm, armyworm
Beans	Cutworms, corn borer, potato leafhopper, Lygus bugs
Chickpeas	Grasshoppers, potato leafhopper, cutworms
Fababeans (broad beans)	Lygus bugs, potato leafhopper, pea aphid
Lentils	Cutworms, grasshoppers, Lygus bugs, pea aphids, potato leafhopper
Peas	Cutworms, grasshoppers, pea aphids, pea leaf weevil
Soybeans	Cutworms, grasshoppers, Lygus bugs, soybean aphids
Timothy	Grasshoppers

Application:

Aerial:

Matador and Silencer: Canola, mustard, sunflower, flax, alfalfa, unimproved pasture -DO NOT make more than 1 application at the 33.2 ml/acre rate per year.

Corn, wheat, barley, oats, potatoes, soybean, dry edible bean, pea, chickpea, lentil, favabean - DO NOT make more than 2 applications at the 33.2 ml/ac rate per year.

Matador: Summerfallow - DO NOT make more than 1 application at the 33.2 ml/acre rate per year.

Ground:

Canola, mustard, sunflower, flax, alfalfa, unimproved pasture, summerfallow (Matador only), corn, wheat, barley, oats - DO NOT make more than 3 applications per year at the 33.2 ml/acre rate.

Potatoes - DO NOT make more than 3 applications per year at the 33.2 ml/acre rate. DO NOT make more than 2 applications per year if using the 50 ml/acre rate. DO NOT exceed 100 ml/acre of lambda-cyhalothrin per year.

Beans, chickpeas, favabeans, lentils, peas, soybeans- DO NOT make more than 3 applications per year. DO NOT graze or harvest treated forage straw or hay for livestock feed.

Timing:

For potato insects, timing of application should be based on the presence of vulnerable pest developmental stages and significant populations as determined by local monitoring.

For sunflower beetles, use the high rate to control adults.

For flea beetles, to prevent migration of over-wintering adults throughout the field, spray a 15 m strip around the field at the first sign of flea beetle feeding.

For grasshoppers, apply the low rate when grasshoppers are up to the 3rd nymphal stage (up to 1 cm in length) or when insect numbers are low. Apply the high rate when insects are larger, up to but not including, winged adults or when insect numbers are high.

For corn borer control apply Matador before the larva bores into the plant stalk or pods

How it Works:

Lambda-cyhalothrin is a synthetic pyrethroid insecticide. It is a fast acting stomach and contact insecticide effective against a broad spectrum of foliar pests. It has no fumigant or systemic activity.

Effects of Weather:

For best results, apply Lambda-cyhalothrin during the early morning before temperatures rise, and during the evening, past the heat of the day.

Tank Mixes:

Herbicides: (Ground only)
Horizon
Tralkoxydim △

Fungicides: (Tank mixes on legumes (bean, chickpea, lentil, pea, soybean) may be applied by ground only) Refer to label for other crops.
Propiconazole △
Quadris (*Matador* only)
Quilt (*Matador* only)
Headline (*Silencer* only) on dry field pea- to control insects and diseases listed on the label of each product. Read carefully and follow all use directions and use precautions on both the *Silencer 120 EC* and *Headline EC* Fungicide labels. Failure to follow the rates of use and timing of application as recommended for each product will result in unsatisfactory control of target pest.

△ Manufacturers may only support specific mixes. Contact the manufacturer for more information.

Restrictions:

Grazing: DO NOT graze or feed lactating dairy animals on treated green cereal forage or treated pasture. DO NOT apply within 14 days of livestock foraging.

Alfalfa seed from treated crops is not to be used for production of "alfalfa sprouts" for human consumption.

Storage: Store above 0 degrees C. Storage below 0 degrees C will not impair the effectiveness of Lambda-cyhalothrin. However, following such storage, agitate well before use.

Others: Allow a 7-day interval between applications. DO NOT apply within 15m of productive fisheries, water or waterfowl habitat.

Buffer Zones:

Application method	Crop	Buffer Zones (metres †) Required for the Protection of:	
		Aquatic Habitats of Depths	
		Less than 1 m	Greater than 1 m
Ground	All field crops	15	15
Fixed wing airplane	Potatoes, oilseed crops, cereal crops, alfalfa, unimproved pasture, summerfallow	100	20
	corn	225	20
	Legume vegetables	600	25

See the key to product pages on page 27 for an explanation of the different habitats.

- Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.
- For tank mixes, consult the labels of the tank mix partners and observe the largest (most restrictive) buffer zone of the products involved in the tank mixture.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Precautions:

Lambda-cyhalothrin has potential for skin and eye irritation. Avoid splashing in eyes or on skin, particularly the face. If hands are contaminated, wash with soap and water before touching other areas of skin. This product is very toxic to bees. Avoid spraying when bees are foraging. Spray deposits should be dry before bees commence foraging in treated crops.

Hazard Rating:

☠ Danger – Poison

For an explanation of the symbols used here see page 11.

Lannate

Insecticide Group – 1A
(Refer to page 441)

Company:

E.I. duPont Canada (PCP#10868)

Formulations:

90% methomyl formulated as a water soluble powder. Container size - 24 x 225 gram water soluble bags.

Insects Controlled and Registered Crops:

CROP	INSECT
Canola	Alfalfa looper, bertha armyworm, clover cutworm, beet webworm
Flax	Bertha armyworm
Peas	Alfalfa looper, pea aphid
Wheat, oats, barley	Armyworm, thrips
Potato	Aphids, leafhoppers, flea beetles, variegated cutworm

Application:

May be applied to canola, flax and cereals by air or ground equipment. Ground applications only to peas and potatoes. Apply when insects exceed threshold levels using sufficient water for good coverage.

Suggested water volumes for ground application:

Potatoes - 100 to 340 L per acre

Canola and flax - 40 L per acre

Wheat, oats, barley, peas - 40 to 140 L per acre

When applied by air, pilot should not assist in mixing and loading operations. Apply a mininum of 9 L of water per acre) for aerial application.

Use higher rates for mature insects, dense canopy or when infestations are heavy.

Apply at 5 to 7 day intervals as necessary.

Early morning or late evening sprays are recommended.

How it Works:

Lannate is a carbamate insecticide that works by contact and ingestion and has some systemic action. Rapidly degraded in green, growing plants; short term residual.

Restrictions:

Storage: DO NOT store below 0°C. Store in original container away from other pesticides, fertilizer, food or feed.

Others: DO NOT handle water soluble bags with bare hands. Sprays or drift must not contact workers, other persons or animals. The area being treated must be vacated by unprotected persons.

Precautions:

Lannate is of high acute mammalian toxicity. May be fatal if swallowed, inhaled or absorbed through the eyes. DO NOT breathe dust or spray mist. DO NOT get in eyes, on skin or on clothing.

Toxic to fish, birds and other wildlife. Keep out of any body of water. DO NOT apply where run-off is likely to occur. DO NOT allow to drift from treated areas. Highly toxic to bees exposed to direct application. DO NOT apply to areas being visited by bees. Time applications to coincide with minimum bee activity.

When mixing, loading or applying *Lannate*, wear protective clothing, goggles and an approved respirator. Wear clean clothes daily. Wash thoroughly after handling or applying.

Hazard Rating:

☠ Danger – Poison

For an explanation of the symbols used here see page 11.

Malathion

Insecticide Group – 1B
(Refer to page 441)

Company:

United Agri Products (*Malathion 85E* – PCP#8372)
IPCO (*Malathion 500* – PCP#5821)

Different companies produce malathion. Note differences in label registrations, formulations and recommendations. Check your label for more information.

Formulations:

Malathion 500 - 500 g/L malathion formulated as an emulsifiable concentrate

Malathion 85E – 85% malathion formulated as an emusifiable concentrate.

Insects Controlled and Registered Crops:

CROP OR STRUCTURE	INSECT
Alfalfa	Grasshopper, aphid, lygus bug, alfalfa weevil larvae, leafhoppers, alfalfa blotch leafminer, spider mites, spittle bugs
Clover (85E only)	Aphids, grasshoppers, leafhoppers, spider mites
Canola, mustard	Flea beetle, diamondback moth, grasshopper
Wheat, barley, oats, rye	Grasshopper, aphid, armyworm, cereal leaf beetle
Potatoes	Colorado potato beetle, leafhopper, aphid, spider mites
Canaryseed (for seed) (85E only)	Aphids
Sweet clover	Sweet clover weevil
Flax, lentils, hay, pasture	Grasshopper
Corn (grain, forage)	Earworms, European corn borers
Beans, peas	Aphids, leafhoppers, spider mites
Empty bin spray (grain bins, grain elevators, grain box cars, flour mills)	Confused flour beetles, flat grain beetles, granary weevils, grain mites, Indian meal moths, lesser grain borers, red flour beetle, rice weevils, rusty grain beetles, saw-toothed grain beetles

Application:

Malathion may be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels using sufficient water for good coverage. Use higher rates for heavy infestations, dense canopy or mature stages of insects.

How it Works:

Malathion is a non-systemic, contact, organophosphate insecticide and acaricide of brief to moderate persistence. Generally non-phytotoxic.

Effects of Weather:

For best results apply when daytime temperatures are above 20°C.

Restrictions:

Grazing: When spraying forages and pastures, cattle should be removed and returned after spraying.

Storage: DO NOT store near food or feed. Store in a cool dry place but not below -10°C. Protect from heat.

Others: Maximum of 2 applications per season. DO NOT apply to any plant in bloom. Apply to crops when bees are absent from field. Avoid contact with automobile paint and wash immediately if exposure occurs.

Precautions:

Malathion has a low acute mammalian toxicity. Highly toxic to bees and fish. Wear protective clothing to reduce skin and eye exposure.

Hazard Rating:

Warning – Poison

For an explanation of the symbols used here see page 11.

Monitor

Insecticide Group – 1B

(Refer to page 441)

Company:

Bayer CropScience, United Agri Products (PCP#12287)

Formulations:

480 g/L methamidophos formulated as a liquid. Container size - 10 L pail.

Insects Controlled and Registered Crops:

CROP	INSECT
Canola	Bertha armyworm, grasshoppers
Potato	Colorado potato beetle, potato flea beetle, potato leafhopper, aphids

Application:

May be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels using sufficient water for good coverage. Use higher rates for mature stages of insects, dense canopy or heavy infestations.

How it Works:

Monitor is a broad spectrum organophosphorous insecticide and acaricide which works by contact and systemic action. Contact effectiveness may persist for 7 to 21 days.

Restrictions:

Storage: Store in a cool, dry place but not below -10°C. DO NOT store near food or feed. Protect from heat.

Others: Only 2 applications per season may be made on canola for Bertha armyworm and grasshoppers. Highly toxic to bees exposed to direct treatment or residues on crops. Avoid use during flowering and pollination periods. DO NOT contaminate any bodies of water.

Precautions:

Monitor is of high acute mammalian toxicity and is extremely toxic to fish, wildlife and bees. Poisonous if swallowed, inhaled or absorbed through skin. Rapidly absorbed through skin. Wear an approved respirator, natural rubber gloves, protective clothing and goggles. Wash hands, arms and face with soap and water after handling and applying. Wash all contaminated clothing with soap and hot water before re-use. Keep unprotected persons out of operating or spray areas or where drift could occur.

DO NOT re-enter treated areas until drifting insecticide and volatile residues have dissipated. DO NOT store or transport with feed or food.

Hazard Rating:

Danger – Poison

For an explanation of the symbols used here see page 11.

Movento 240 SC

Insecticide Group – 23
(Refer to page 441)

Company:

Bayer Crop Science (PCP#28953)

Formulations:

Spirotetramat formulated as a suspension concentrate - 240 g/L

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Aphids
Beans, chickpea, lentil, peas, soybean	Aphids

Application:

Ground application only, except in potatoes and soybeans. Apply in adequate water for uniform coverage, a minimum of 120 L/ac. If needed repeat application with a minimum of 7 to 10 day interval. DO NOT exceed a maximum of 292 mL / acre per season.

For best results apply when insect populations begin to build and before a damaging population becomes established. Select the appropriate rate depending on the development stage of the insect and level of infestation.

How it Works:

Movento is a systemic, tetramic acid insecticide. Following application to plant foliage *Movento* moves through phloem and xylem to all plant tissues including new shoot, leaf and root growth. Mode of action is primarily by ingestion by immature insect life stages.

Restrictions:

DO NOT apply this product directly to freshwater habitats (such as lakes, rivers, sloughs, ponds, creeks, marshes, streams, reservoirs and wetlands). DO NOT apply during periods of dead calm. Avoid application when winds are gusty. DO NOT apply droplets smaller that American Society of Agricultural Engineers (ASABE) fine classification. Boom height must be 60 cm or less above ground.

Re-Entry: DO NOT enter or allow worker entry into treated areas for a period of 12 hours.

Re-cropping: A plant back interval of 30 days is required for all crops not on the label.

Precautions:

Movento is toxic to bees through direct contamination of pollen and nectar. DO NOT apply this product during crop flowering period or when flowering weeds are present in the field.

Hazard Rating:

Caution – Poison

For an explanation of the symbols used here see page 11.

Nolo Bait

Company:

M&R Durango, Inc. (PCP#29197)

Formulations:

Wheat bran coated with spores of the protozoan *Nosema locustae.*

Minimum of 2.2x10^6 spores of *Nosema (Paranosema) locustae* Canning per gram.

Insects Controlled and Registered Crops:

CROP	INSECT
Crop and Rangeland	Grasshoppers

Rates:

Apply at a minimum rate of 0.45 kg per acre.

Consumption of a higher number of spores per grasshopper will increase product efficacy and decrease the amount of time required to kill grasshoppers. Where greater efficacy or faster population reduction is required, this may be achieved through multiple applications or a higher application rate to increase the amount of bait available to each grasshopper.

Application:

For best results, apply when most grasshoppers are in the 3rd instar (12 to 19 mm long).

Apply by hand, seed spreader, turbine spreader or airplane. Concentrate the application in areas of heaviest grasshopper infestation.

Insecticide Group – Biological Insecticide

(Refer to page 441)

How it Works:

Nolo Bait must be consumed by the target insect to be effective. It infects the fat bodies of most species of grasshoppers and some crickets. Infection and sickness of the grasshopper begins upon ingestion of the bait by the grasshopper. As the *Nosema locustae* population increases inside the grasshopper it becomes lethargic, reduces its feeding and has lowered reproductive capacity. Grasshopper death will begin in 3 to 6 weeks. The pathogen may remain in the grasshopper population for several years following treatment.

Restrictions:

Preharvest interval: 0

Storage: Store product in original container in a cool, dry location (preferably at or below 20°C). Use within 13 weeks from the date of manufacture.

Precautions:

May cause sensitization. Avoid contact with skin, eyes, or clothing. Avoid breathing dust or spray mist.

DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Hazard Rating:

⚠ Caution – Potential sensitizer
Wheat allergen

For an explanation of the symbols used here see page 11.

Oberon

Insecticide Group – 23

(Refer to page 441)

Company:

Bayer CropScience Inc. (PCP#28905)

Formulations:

240 g/L spiromesifen formulated as a suspension concentrate

Container size - 2 L jug

Insects Controlled and Registered Crops:

CROP	INSECT
Alfalfa (seed production only)	Two-spotted spider mite
Corn	Banks grass mite, two-spotted spider mite

Application:

May be applied by ground or air.

Apply as soon as mite populations reach threshold levels. Repeat application if pest populations recover and reach economic thresholds. A minimum interval of 7 days between applications is required.

Thorough coverage of all plant parts is important for optimum performance. Use sufficient water volumes for thorough coverage - i.e. minimum of 40 to 80 litres of water per acre.

Avoid application when heavy rain is forecast.

How it Works:

Spiromesifen is in the Tetronic acid class of insecticides and works by contact, inhibiting lipid biosynthesis in the insect. *Oberon* has strong adhesion to the leaf surface, and also some translaminar activity providing residual control through contact or ingestion. *Oberon* has activity on all mite developmental stages. Immature mite stages tend to be more susceptible to *Oberon* than adults.

Restrictions:

Alfalfa – DO NOT exceed 3 applications per season. Keep a minimum interval of 7 days between applications. DO NOT exceed a maximum of 1200 ml per acre of *Oberon* per season. Corn – DO NOT exceed 2 applications per season. DO NOT exceed 240 mL per acre per 14 day interval. DO NOT exceed 480 mL per acre per season.

DO NOT enter or allow entry into treated areas for a period of 12 hours after application.

Oberon is toxic to aquatic organisms and beneficial insects such as pollinators. DO NOT apply this product directly to freshwater habitats such as lakes, rivers, sloughs, ponds, creeks, marshes, streams, reservoirs, ditches and wetlands.

Buffer Zones:

Application method	Buffer Zones (metres [†]) Required for the Protection of:		
	Aquatic Habitats of Depths		Terrestrial habitat
	Less than 1 m	Greater than 1 m	
Ground	10	3	2
Fixed wing airplane	800	100	85

See the key to product pages on page 27 for an explanation of the different habitats.

- Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.

[†] Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

DO NOT mix, load or clean equipment within 30 metres of wellheads or aquatic systems.

Rotational plant-back intervals for:
Field corn – immediate plant back
Wheat, barley and alfalfa – 30 days
All other crops – 12 months

Precautions:

Apply *Oberon* insecticide during pre-bloom, early bloom or late bloom when pollinators are not present in the field. DO NOT apply *Oberon* when pollinators are actively foraging in the treatment area.

Storage: Store in a cool, dry place in such a manner to prevent cross contamination with other pesticides, fertilizers, food and feed.

DO NOT store below freezing.

Hazard Rating:

Caution – Poison

Eye irritant

For an explanation of the symbols used here see page 11.

Orthene

Insecticide Group – 1B
(Refer to page 441)

Company:

Distributed by United Agri Products (PCP#14225)

Formulation:

75% acephate as a water soluble powder. Container size-case of 12 x 1.5 kg

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Green peach aphid, potato aphid, potato flea beetle, potato leafhopper, tarnished plant bug

Preharvest Interval

DO NOT apply within 21 days of harvest.

Application:

Apply with conventional ground equipment only. DO NOT apply by air.

Apply only when insects exceed economic thresholds.

Use higher rate only for heavy infestations.

How it Works:

Acephate is an organophosphate systemic insecticide that works through contact and as a stomach poison.

Effects of Weather:

DO NOT apply if rainfall is expected within 48 hours after application. Treatment areas should not be irrigated for at least 48 hours after application.

Restrictions:

Storage: Store in cool, dry place, in the original container away from food or feed. Protect from excessive heat.

Environment: *Orthene* has the potential to leach through soils to ground water. It is recommended that *Orthene* is not used on coarse textured soils or in areas where the water table may be high.

DO NOT feed foliage to livestock or allow animals to graze on treated areas.

DO NOT make more than 4 applications per season.

Others: *Orthene* is not registered in the United States. Therefore *Orthene* should not be used on any produce destined for markets in the United States.

Precautions:

Orthene is toxic to birds and mammals.

Orthene is toxic to aquatic invertebrates. DO NOT apply where runoff or drift is likely to occur.

Orthene is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. DO NOT apply this product or allow it to drift to blooming crops or weeds if bees are foraging in the treatment area. Beekeepers should be warned to protect bees from treated areas for one week after treatment.

First Aid:

If swallowed, induce vomiting and obtain medical attention or call a poison control centre immediately. In case of contact with skin, wash with soap and water. If in eyes, flush with water. See a physician if eye irritation persists. Atropine is an antidote.

Hazard Rating:

☠ Caution – Poison

For an explanation of the symbols used here see page 11.

Permethrin

Insecticide Group – 3A
(Refer to page 441)

Company:

FMC Corporation (*Pounce* – PCP#16688)
(Distributed by United Agri Products Canada Inc.)

United Phosphorous (*Perm-UP* – PCP#28877)

Amvac Chemical Corporation (*Ambush* – PCP#14882)

Formulations:

Pounce, Perm-UP - 384 g/L permethrin formulated as an emulsifiable concentrate. Container size – 1 L (12 x 1L).

Ambush - 500 g/L permethrin formulated as an emulsifiable concentrate. Container size - 1 L, 5 L

Insects Controlled and Registered Crops:

CROP	INSECT
Cereals, corn, flax, lentil, pea, potato, sunflowers	Cutworms
Canola, rapeseed	Cutworms, crucifer flea beetle
Potato	Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug, variegated cutworm, European corn borer

Application:

Permethrin may be applied by ground or air. Apply when insects exceed economic threshold numbers and use sufficient water for good coverage. Use higher rates for heavy infestations, adult insects and dense foliage. For cutworm control application should be made under warm, moist conditions in the evening or at night. Use high rates if larvae are near maturity or soil conditions are dry. Do not disturb soil surface for five days after treatment.

How it Works:

Permethrin is a synthetic pyrethroid insecticide. It is a stomach and contact insecticide with no systemic or fumigant effects.

Restrictions:

Grazing: Cover crops or crops treated with permethrin should not be used as a green feed for animals.

Storage: Store above 0°C.

Others: Observe a 16 yard (15 m) setback distance for ground and 110 yard (100 m) setback distance by air near water bodies or other sensitive areas.

Precautions:

Permethrin is of low acute mammalian toxicity. Permethrin is very toxic to bees and fish. DO NOT contaminate ponds, lakes or streams while filling sprayer or spraying. Avoid spraying when bees are foraging.

Hazard Rating:

☠ Caution – Poison

For an explanation of the symbols used here see page 11.

Rimon 10 EC

Insecticide Group – 15
(Refer to page 441)

Company:

Chemtura (PCP#28881)
MANA Canada (PCP#28515)

Formulations:

10% novaluron formulated as an emulsifiable concentrate

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Colorado potato beetle, European corn borer
Alfalfa (MANA formulation only)	Lygus bug nymphs

Application:

For ground application only.

A minimum spray volume of 40 litres per acre should be used with ground sprayer equipment. Higher water volumes will provide better coverage and product performance.

Use hollow cone, disc-core hollow cone or twin jet nozzles suitable for Insecticide spraying. Drop nozzles may be required to obtain uniform coverage against certain insect pests that develop down in the canopy. Use higher application rates and spray volumes for higher insect pressure.

Colorado potato beetle - Application should be made when the majority of the population is at egg hatch to the second instar of larval development.

European corn borer - Scout for European corn borer to monitor egg-laying and egg hatch to determine timing of application. The first application should be made just prior to egg hatch.

Re-application on a 10 to 14 day interval will be required to protect new growth or if monitoring indicates that it is necessary to keep pest populations below economic thresholds.

How it Works:

Rimon 10 EC is an insect growth regulator that must be absorbed by eggs or ingested by insect larvae to be fully effective. The primary mode of action is by disrupting cuticle formation and deposition occurring when insects change from one developmental stage to another, resulting in death at molting. Due to this mode of action *Rimon 10EC* does not have any effect on adult stages of insects that have completed larval development.

Restrictions:

DO NOT make more than 2 applications per year per crop per season.

DO NOT apply more than 656 ml of *Rimon 10 EC* per acre per season.

DO NOT apply within 14 days of harvest (Preharvest interval).

Precautions:

DO NOT re-enter treated areas for a period of 12 hours after application.

Rimon 10 EC is toxic to aquatic organisms. DO NOT apply *Rimon 10 EC* directly to water or to areas where surface water is present. An untreated buffer zone between the last spray swath and the edge of aquatic systems (such as rivers, streams, lakes, and other water bodies) must be established. Refer to label for specific buffer zone requirements.

Rimon 10 EC is toxic to immature insects. Minimize spray drift in habitats next to the application site (e.g. hedgerows and wood- lands) to reduce harmful effects on beneficial insects.

Rimon 10 EC may be toxic to bee colonies exposed to direct treatment, drift or residues on flowering crops or weeds.

Avoid applying this product to flowering crops or weeds if bees are visiting the treatment area.

Storage: To prevent contamination, store this product away from food or feed.

If this product is to be applied to a product destined for export to the United States, information on acceptable residue levels are available at www.croplife.ca

Hazard Rating:

⚠ Warning - May cause substantial but temporary eye injury. Harmful if absorbed through skin. DO NOT get on eyes or clothing.

Keep out of Reach of Children.

For an explanation of the symbols used here see page 11.

Sevin XLR Plus

Insecticide Group – 1A
(Refer to page 441)

Company:

Tessenderlo Kerley, Inc. (PCP#19531)

Formulation:

480 g/L carbaryl formulated as a liquid suspension

Insects Controlled and Registered Crops:

CROP	INSECT
Canola	Flea beetle
Alfalfa, clover	Grasshoppers, blister beetle, leafhoppers, alfalfa caterpillar, armyworm
Barley, oats, rye,	True armyworm, grasshoppers
Beans	Leafhoppers, lygus bugs, climbing cutworms
Ditchbanks, field borders, forage grasses, headlands, pastures, rangelands, rights-of-way, wastelands	Grasshoppers
Corn	European corn borer, corn earworm, fall armyworm, grasshoppers
Potato	Colorado potato beetle, flea beetle, leafhopper, European corn borer, climbing cutworms

Application:

May be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage. Use lower rates on young plants and early stages of insects and higher rates on mature plants and advanced stages of insects, or mature insects.

Sevin XLR Plus applications are more resistant to wash-off when applied as a concentrated suspension. To ensure wash-off resistance is retained, apply dilutions of 1 part *Sevin XLR Plus* to no greater than 39 parts water. For example, if applying 1 L/ac of *Sevin XLR Plus* DO NOT exceed 40 L/ac total application volume. Applications should be made to dry foliage to maximize wash-off resistance.

How it Works:

Sevin XLR Plus is a carbamate insecticide that works by contact (approx. 20%) and ingestion (approx. 80%). Moderate to rapid in speed of action with short to moderate residual activity (2 to 4 weeks).

Restrictions:

Storage: DO NOT store in areas where temperatures frequently exceed 38°C. Store in original container in a cool dry area out of reach of children and animals and away from food and feed.

Grazing: Remove cattle from area when spraying. Crops may be grazed or harvested for feed: Dairy animals - 48 hours after treatment; Meat animals - 24 hours after treatment.

Precautions:

Sevin XLR Plus is of moderate acute mammalian toxicity. This product is highly toxic to honeybees exposed to direct treatment on blooming crops or weeds. Harmful if inhaled or swallowed. Avoid contact with skin and eyes. Wear long-sleeve work clothing and change to clean clothing daily. Wash hands and face after handling. Avoid contamination of food, feed, water supplies, streams and ponds.

Hazard Rating:

☠ Warning – Poison

For an explanation of the symbols used here see page 11.

Sluggo

Molluscicide – no group

Company:

Engage Agro Corporation (PCP#30025)

Formulation:

0.76 % ferric phosphate in a granular formulation

Container size - 5, 25 kg bags

Pest Controlled and Registered Crops:

CROP	INSECT
Field crops	Slugs and snails

Rates:

Apply bait evenly at a rate of 10.1 to 20.2 kg / acre (2.5 to 5 g per square metre).

Application:

Apply in the evening as slugs and snails travel and feed mostly at night or early morning. DO NOT place in piles. For best results the ground should be moist but with little or no standing water.

For broadcast application, standard broadcast spreaders may be used. For row application, standard granular spreaders may be used.

At seeding and later stages, apply the bait between rows and around the perimeter of the field. Treating around the perimeter of crop areas may intercept slugs or snails migrating from daytime refuge sites.

Apply at the higher rate within the recommended rate range if the infestation is severe, if the area is heavily watered or after long periods of heavy rain.

Re-apply as the bait is consumed or at least every two weeks if slugs and snails continue to be a problem.

How it Works:

Sluggo must be consumed by the slugs or snails to be effective. After ingesting the bait, slugs and snails stop feeding providing immediate protection to plants. Affected slugs and snails die within 3 to 6 days.

Restrictions:

Avoid direct application to ponds streams and lakes. This product may be toxic to fish and other aquatic organisms.

Precautions:

Avoid contact with eyes. May cause eye irritation.

Wear chemical resistant gloves during mixing and loading activities and when applying by hand.

Hazard Rating:

⚠ Warning – contains the allergen wheat

For an explanation of the symbols used here see page 11.

Success 480 SC

Insecticide Group – 5
(Refer to page 441)

Company:

Dow AgroSciences (PCP#26835)

Formulation:

480 g/L spinosad formulated as a suspension concentrate
Container size - 1L jug

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Colorado potato beetle lavae and European corn borer larvae

Application:

Apply *Success 480 SC* as a foliar spray by ground only. DO NOT apply by air. Apply when scouting indicates the target pest species have reached economic threshold levels. For Colorado potato beetle, target eggs at hatch or small larvae. For control of European corn borer, time the application to coincide with peak egg hatch. Use higher application rate for higher pest pressure or when extended egg hatch is anticipated. If pest populations persist, a repeat application 7 to 10 days after the initial application may be necessary.

How it Works:

Success 480 SC is in the spinosyn class of insecticides. It is a contact and stomach insecticide. It is derived from the fermentation of *Saccharpolyspora spinosa.*

Effects of Weather:

This product has the potential for run-off. DO NOT spray immediately after a rainfall or if rain is forecast within 48 hours after application.

Restrictions:

Storage: Avoid freezing. DO NOT store or ship with food, feeds, drugs or clothing.

Others:
Potatoes - DO NOT apply more than a maximum seasonal rate of 100 ml/acre.
DO NOT apply within 7 days of harvest.

DO NOT enter or allow worker entry into treated areas for a period of 4 hours after application.

Precautions:

Success 480 SC is highly toxic to honey bees exposed to direct spray. Avoid spraying on crops in bloom or other vegetation when bees are actively foraging. This product is toxic to other beneficial parasites and predators. DO NOT contaminate aquatic habitats such as ponds, lakes, rivers, streams and wetlands during application or when rinsing equipment and containers.

Buffer Zones: A buffer zone of 2 metres (early season) or 1 metre (late season) is required between downwind edge of spray boom and sensitive aquatic habitats. Avoid contact with eyes, skin, and clothing.

Hazard Rating:

☠ Caution – Poison

For an explanation of the symbols used here see page 11.

Thimet 15G

Insecticide Group – 1B
(Refer to page 441)

Company:

Amvac Chemical Corporation (PCP#10532)

Note:

Last date of sale of Thimet 15-G by retailers and distributors - 1 May 2015

Last date of use of Thimet 15-G by growers and users - 1 August 2015

Formulations:

15% phorate formulated as a granular.
Container size- 20 kg bag.

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Reduction of wireworm damage.

Application:

Ground application at seeding time: Distribute granules evenly in furrow or granules may be banded on each side of the row at planting time. Use low rate for sandy or light soils and high rate for silt or heavy soils. For use only in hoppers equipped for Lock 'N Load containers to maintain a closed system.

How it Works:

Phorate is an organophosphate insecticide that works as a systemic poison, with effective initial residual activity on soil and foliar insects.

Restrictions:

Storage: DO NOT store in or around the home. Store away from food or feed. Store open bags in labeled sealed drums or heavy plastic bags.

Others: DO NOT use in muck soils. DO NOT apply later than at planting time. Will provide reduction of wireworm damage.

Precautions:

Thimet is of high acute mammalian toxicity and is highly toxic to fish, birds and other animals. DO NOT allow product to contact eyes and skin. Poisonous by skin contact, inhalation or swallowing. Repeated inhalation or skin contact with Thimet 15G, other organophosphorus or carbamate insecticides may, without symptoms, progressively increase susceptibility to poisoning. Wear freshly-laundered, long-sleeved work clothing daily. Use rubber gloves when transferring from package to equipment. Sleeve cuffs should be worn over gloves to prevent granules from falling into the gloves. Rubber gloves should be washed with soap and water after each use. Destroy and replace gloves frequently. In case of contact, immediately remove contaminated clothing and wash skin thoroughly with soap and water.

Hazard Rating:

☠ Danger – Poison

For an explanation of the symbols used here see page 11.

Vydate L

Insecticide Group – 1A
(Refer to page 441)

Company:

E.I. duPont Canada (PCP#17995)

Formulation:

240 g/L oxamyl
Container size - 10 L jugs

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Colorado potato beetle, flea beetles, aphids, potato leafhopper, Lygus bugs

Application:

Apply *Vydate* as a foliar spray by ground only. Apply sufficient volume of spray solution to thoroughly wet foliage (minimum water volume 120 to 360 L per acre). Make application when insects appear at economic levels. Repeat weekly as required. Use low rate for light infestations. Use higher rate for severe infestations or if aphids are the primary pest species.

Avoid application when heavy rain is forecast.

How it Works:

Vydate is a carbamate insecticide that works by contact and ingestion.

Vydate will not control Colorado potato beetles resistant to other carbamate insecticides.

Restrictions:

DO NOT apply *Vydate* by air.
DO NOT apply within 7 days of harvest.
DO NOT apply directly to water. DO NOT apply where run-off is likely to occur. DO NOT apply when weather conditions favour drift to untreated areas and when wind speed exceeds 10 km/hr.
DO NOT enter or allow worker entry into treated areas during the restricted entry interval of 3 days.
DO NOT apply more than 2 times per season.

Storage: DO NOT freeze. DO NOT store or transport with food, feeds, drugs or clothing.

Buffer zones:

Application method	Crop	Buffer Zones (metres †) Required for the Protection of:		
		Freshwater habitat of depths:		
		Less than 1 m	1 – 3 m	Greater than 3 m
Ground	Potato	2	1	0

See the key to product pages on page 27 for an explanation of the different habitats.

- Buffer zones can be reduced by 70% when using shrouds and by 30% when using cones mounted less than 12 inches from the crop canopy.
- For tank mixes, consult the labels of the tank mix partners and observe the largest (most restrictive) buffer zone of the products involved in the tank mixture.

† Distance measured as metres from the downwind edge of the spray boom to sensitive habitat.

Precautions: *Vydate* is toxic to fish, birds and other wildlife.

Vydate is toxic to honey bees exposed to direct spray and should not be used when bees are active in the treatment area.

Avoid contact with eyes, skin and clothing.

Precautions:

Vydate is toxic to fish, birds and other wildlife.

Vydate is toxic to honey bees exposed to direct spray and should not be used when bees are active in the treatment area. Avoid contact with eyes, skin, and clothing.

Hazard Rating:

☠ Danger – Poison

For an explanation of the symbols used here see page 11.

Notes

Weatheradio Canada

Weatheradio is a network of radio stations operated by the weather service of Environment Canada which transmits weather information continuously over VHF-FM radio. The service operates 24 hours each day, seven days a week, providing up-to-the minute weather forecasts and reports detailed to each broadcast area.

Weatheradio is transmitted from 13 locations in Saskatchewan:

- Estevan, Prince Albert, Stranraer, Regina Beach, Lanigan and Waseca on frequency 162.400;
- Regina, Swift Current, Yorkton and Saskatoon at 162.550 (Medicine Hat west of Maple Creek); and
- North Battleford, Lake Diefenbaker (Elbow) and Broadview at 162.475.

The Pest Control Products (Saskatchewan) Act and Regulations related to that Act require that any person who applies a pesticide for commercial purposes must have a valid applicator's licence.

To be eligible for a licence, appropriate training is required from the Agriculture Division of The Saskatchewan Institute of Applied Science and Technology (SIAST):

Phone: 1-800-goSIAST (467-4278)

Further details regarding licensing requirements can be obtained from the Crops Branch of Saskatchewan Agriculture.

Phone: (306) 787-4662

Meteorological Service of Canada

Weather One-on-One Service	
(charge to phone)	1-900-565-5555
(charge to credit card)	1-888-292-2222
Weather Information	
Broadview	(306) 696-2229
Estevan	(306) 634-2833
Hudson Bay	(306) 865-2721
Lanigan	(306) 365-3011
Lloydminster	(780) 875-7709
Medicine Hat, AB	(403) 526-0483
North Battleford	(306) 445-7000
Prince Albert	(306) 929-2114
Regina	(306) 780-5744
Saskatoon	(306) 975-4266
Swift Current	(306) 773-5599
Whitewood	(306) 735-2928
Yorkton	(306) 782-1511

Severe Weather Reporting and Weather Awareness
Call toll free 1-800-239-0484

The **Prairie Crop Protection Planner,** a Windows-based computer program, is available to accompany this publication. The Planner will help you make quick, accurate decisions about chemical pest control options. Access to an IBM-compatible computer is required.

For the current pricing or further details on this software, contact the Centre for Continuing & Distance Education at the University of Saskatchewan:

Phone: (306) 966-5565
Fax: (306) 966-5567
Website: www.extension.usask.ca
Look under agriculture in the menu.

Crop Protection Companies

Ag West Inc.
www.agwest.net
1-877-924-9378

Arysta LifeScience
www.arystalifescience.ca
1-866-761-9397

BASF
www.agsolutions.ca
1-877-371-2273

Bayer CropScience
www.bayercropscience.ca
1-888-283-6847

Chemtura
www.chemturacrop.com
1-800-350-1745

Cheminova
www.cheminova.com
1-888-316-6260

Degesch America Inc.
www.degeschamerica.com
1-800-330-2525

Dow AgroSciences
www.dowagro.ca
1-800-667-3852

E.I. DuPont Canada
www.dupont.ca/ag
1-800-667-3925

Engage Agro
www.engageagro.com
1-866-613-3336

Gowan Canada
www.gowanco.com
1-800-883-1844 ext.2

Great Northern Growers
www.gng.ag
1-866-727-5226

Hedley Technologies
www.hedleytech.com
1-888-476-4473

IPCO
www.ipco.ca
(204) 233-3461

MANA Canada
www.manainc.ca
1-855-264-6262

Monsanto
www.monsanto.ca
1-800-667-4944

Norac Concepts
www.noracconcepts.com
(613) 841-2907

Nufarm Agriculture
www.nufarm.ca
1-800-868-5444

Peacock Industries
www.grasshoppercontrol.com
(306) 225-4691

Syngenta Canada
www.syngenta.ca
1-877-964-3682

United Agri Products (UAP)
www.uap.ca
1-800-561-5444

United Phosphorus Inc. (UPI)
www.upi-usa.com
1-866-287-9190

Valent BioSciences
www.valent.com
1-800-898-2536

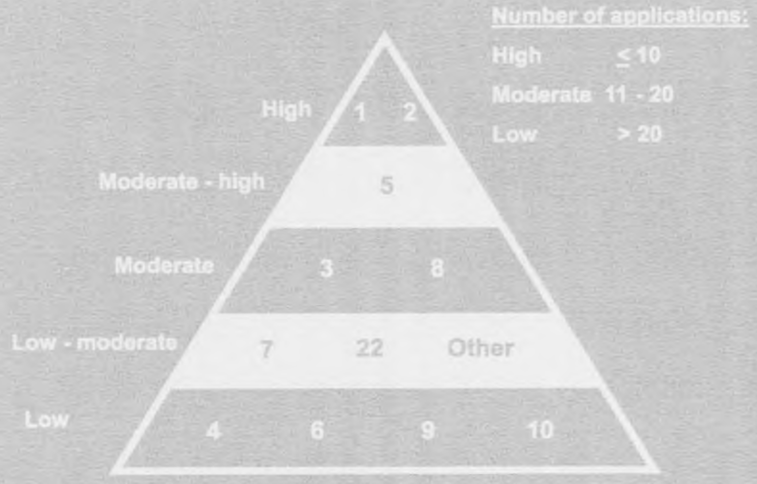
Viterra
www.viterra.com
(contact local retail)

HERBICIDE ROTATION - 2013

Resistance to a pesticide group will reduce the effectiveness of pesticides in that group over time. Rotation of herbicides and other pesticides is an important measure to delay the onset of resistance to any one pesticide group or mode-of-action.

By rotating herbicides, the risk of developing widespread resistance over a field drops. The illustration below gives a relative ranking of risk of resistance developing from repeated use. The top of the triangle indicates groups that may develop resistance quickly. Those at the bottom of the triangle have demonstrated a low risk of resistance developing over long-term use. Be aware that low risk does not mean no risk, since weeds have developed resistance to herbicides in these groups as well.

Herbicide Resistance Development Risk Based on Number of Applications



Classification of herbicide group numbers by risk of selection for weed resistance
('Other': all other herbicide groups that pose a low or moderate risk)
Adapted from Beckie, H. J., 2006 *Herbicide Resistant Weeds: Management Tactics & Practices*
Weed Technology Vol. 20 Issue 3 (July-September) pp. 793-814.

Rotation of Herbicides to Prevent Resistance

OTHER GROUPS
Linuron (7), Liberty (10), Amitrole (11), Dual II Magnum (15), Frontier Max (15), Kerb (15), Primextra Magnum* (15), Distinct* (19), OverDrive (19), Casoron (20), Gramoxone (22), diquat (22), Infinity (27), Tundra (27)*, Velocity m3 (27)*

GROUP 14
(Grass & Broadleaf control)
Aim, Authority, Authority Charge, Blazer, CleanStart*, flumioxazin, Heat, Reflex

GROUP 9 (Grass & Broadleaf control)
CleanStart*, Eclipse*, glyphosate, glyphosate/dicamba*, PrePare + glyphosate*, PrePass*

GROUP 8 (Grass & Broadleaf control)
Avadex, Avenge, Eptam, Fortress*

GROUP 6
(Broadleaf Control)
Basagran, bromoxynil, bromoxynil / 2,4-D ester*, bromoxynil / MCPA ester*, Infinity*, Tundra*,Velocity m3*, Viper*

GROUP 1 (Grass Control)
Axial, Axial Xtreme* Broadband*, clethodim, clodinafop, Equinox, fenoxaprop, Poast Ultra, quizalofop, Signal D*, tralkoxydim, Traxos, Tundra*

GROUP 5
(Grass & Broadleaf control)
Atrazine, Primextra Magnum*, Sencor, simazine, Velpar

GROUP 2 (Grass & Broadleaf control)
Accent, Adrenalin*, Altitude FX*, Ares, Barricade*, Broadband*, Express Pro, Everest GBX*, flucarbazone, Frontline*, Imazamethabenz, imazethapyr, metsulfuron, Muster, Odyssey, Option, Pinnacle, PrePare, PrePare + glyphosate*, PrePass*, Prism, Simplicity, Solo, Spectrum*, Stellar*, thifensulfuron / tribenuron, tribenuron, Triton C and K*, Varro, Velocity m3*, Viper*

GROUP 3 (Grass & Broadleaf control)
Edge, Fortress*, Trifluralin

GROUP 4 (Broadleaf Control)
2,4-D, 2,4-DB, Adrenalin*, Altitude FX*, Axial Xtreme*, Barricade*, bromoxynil / 2,4-D ester*, bromoxynil / MCPA ester*, Curtail M, dicamba, dicamba / mecoprop / MCPA, dichlorprop / 2,4D, Distinct*, Dyvel, Dyvel DSp, Eclipse*, Everest GBX*, fluroxypyr + 2,4-D, Frontline*, glyphosate/dicamba*, Lontrel, MCPA, MCPB / MCPA, mecoprop, Momentum, Optica Trio, OverDrive*, Prestige, Pulsar, Spectrum*, Stellar*, Triton C and K*, Trophy, and mixes containing these active ingredients

* Some products contain more than one active ingredient and therefore may appear in more than one group.

SASKATCHEWAN MINISTRY OF AGRICULTURE
3085 Albert Street Regina, Saskatchewan CANADA S4S 0B1

www.agriculture.gov.sk.ca

Printed January 2013 34M ISBN
088656-59953 0164